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The AUTOMOBILE

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Number 9

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The history of perfecting the internal combustion engine to its present high efficiency is paralleled by the remarkable record of

Champion advancement in spark plug reliability, endurance and certainty of performance.

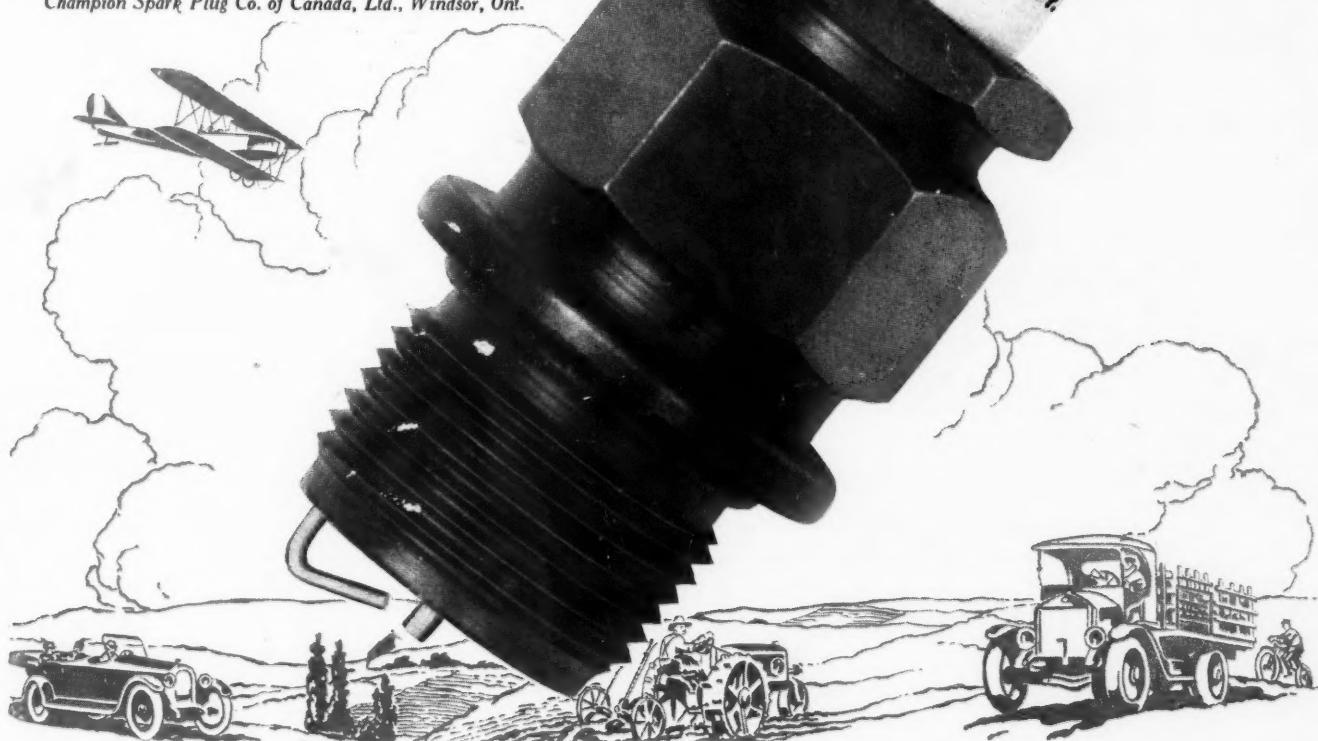
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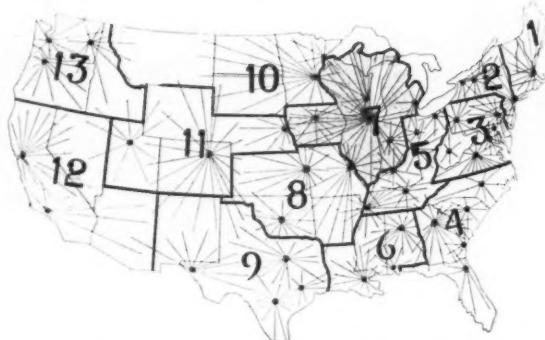
Toledo, Ohio

Champion Spark Plug Co. of Canada, Ltd., Windsor, Ont.

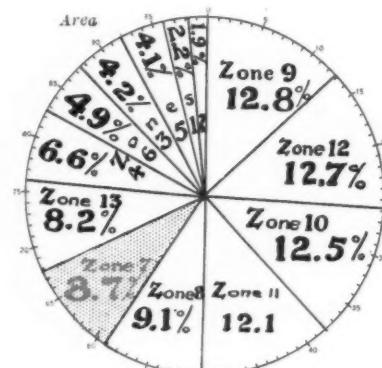
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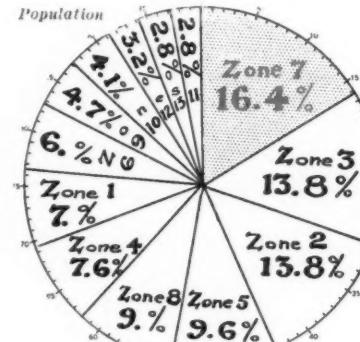
The Futility of Sowing Wheat by Aeroplane



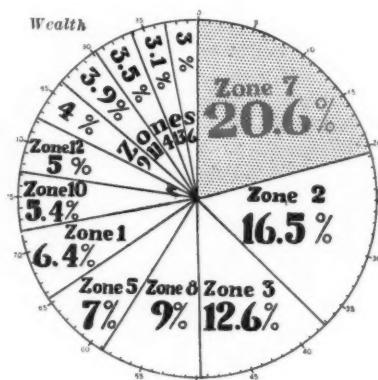
This map shows the United States divided into thirteen logical merchandising zones. The dots represent 43 dominant trading centers and the radiating lines the zones of influence of the metropolitan newspapers in each city. The following graphic charts will aid in solving the problem of apportioning advertising and sales efforts among the different zones.



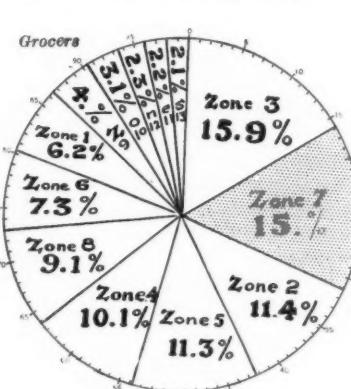
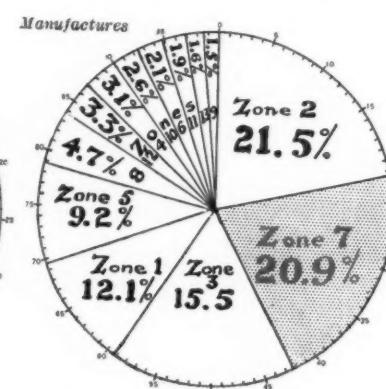
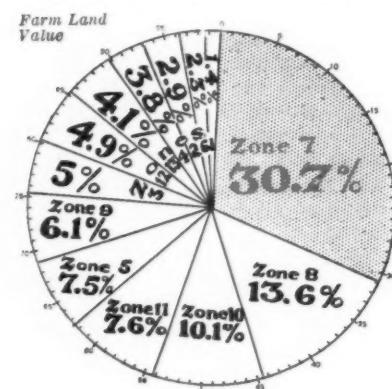
Note that the Chicago territory—Zone 7—has only 8.7% of the area of the country, but its farm land is worth almost half as much as that of all the rest of the United States combined. The Chicago market rests on the most secure foundation the human mind can conceive—the fertile prairies of the great American corn belt. These farms create billions of dollars of new wealth each year. And this year's crop will break all records.



Not only has the Chicago territory 16.4% of the total population of the United States in 8.7% of the area, but this 16.4% of the population has 20.6% of the national wealth. Note also that only the Chicago territory excels both industrially and agriculturally. The zone which is second in farm land value is sixth in manufactures and the only zone which leads the Chicago territory in manufactures is eleventh in farm land value.



Every grocer represents a certain sales problem and expense that must be met before a food manufacturer's product can find its way to that grocer's customers. It is obvious that by selling the grocers of the Chicago territory—15% of the total—access is had to 20.6% of the purchasing power of the country. In contrast, note another zone where one must sell 10% of the grocers of the United States to reach 3.5% of our buying power.



For a more thorough discussion of this subject write for the Tribune's 1919 BOOK OF FACTS on Markets and Merchandising which will be sent free to any agency manufacturer or selling organization if requested on business stationery.

The Chicago Tribune
THE WORLD'S GREATEST NEWSPAPER

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XLI

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No. 9

How Britain Has Organized Its Aircraft Ministry

This Description of the Organization Great Britain Has Established for the Control and Promotion of Aviation Is of Peculiar Interest in This Country Because of the Steps Being Taken to Organize a Federal Control Here

By Allen Sinsheimer

WASHINGTON, Aug. 27.

IN view of the commendation given the British Ministry of Air in the report of the American Aviation Mission it is interesting and important to study the form of the Ministry and contrast it with American plans and organizations.

The British air operations are directly under the King as General-in-Chief and in turn under the Air Council, of which Winston Spencer Churchill, who is also Minister of War, is President. The Council includes in turn a Secretary of State for Air, which position is held by Churchill; an under-Secretary of State for Air, who is also the Vice-President of the Air Council; the Finance Member, the Chief of the Air Staff, the Controller-General of Civil Aviation, the Director General of Supply and Research, the Administrator of Works and Buildings, two additional members and a Secretary.

Contrary to general opinion, the Air Ministry is not a supreme body, but instead is subordinate to the Air Council. The Air Ministry comprises a Sub-Secretary of State for Air, his under-secretary, the Secretary of the Air Council, Assistant Secretary of the Air Council and individual secretaries for these members. It controls and includes the Department of the Air Council, the Department of Finance, Department

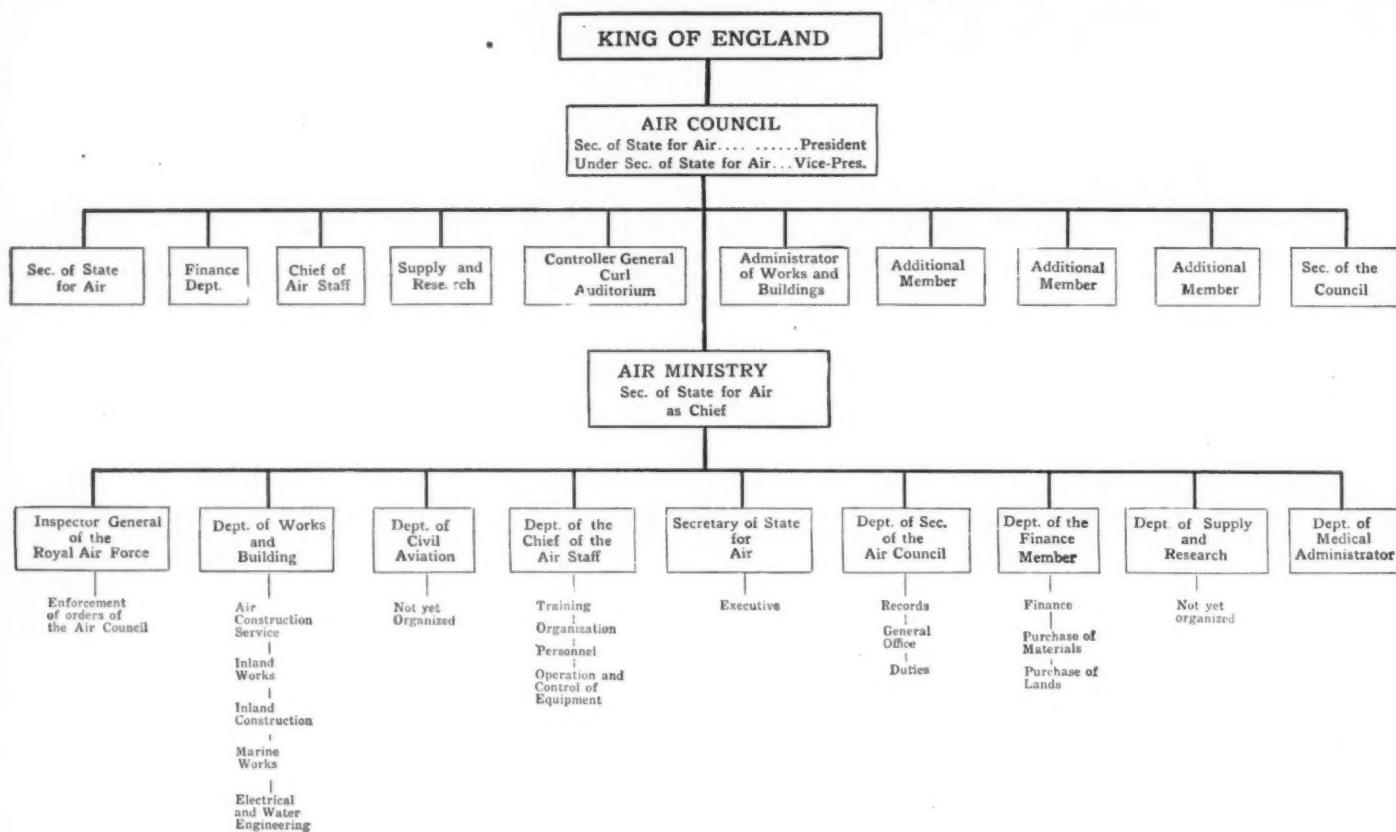
of the Chief of Air Staff, Department of Civil Aviation, Department of Supply and Research, Medical Administrator, Department of Works and Buildings, Department and Inspector-General of the R. A. F.

The Air Ministry is supreme under the Air Council in all matters pertaining to aviation, civil or military. Great Britain makes no distinction between naval and military aeronautics. It places both under the title of "service aeronautics," and the Air Ministry and Air Council function chiefly for service aeronautics, excepting the Department of Civil Aviation, which, however, must in turn co-operate completely with the other departments and function according to the requirements of service aeronautics.

The Department of Finance controls the purchase of lands, demobilization, purchase of and payment for materials and all matters relative to finances. The Department of the Chief of the Air Staff has charge of training and organization, personnel and equipment. The Chief is under him, in addition to deputies, a Director of Training, a Director of Personnel and a Director of Equipment. This department is completely controlled under direction of the Air Ministry of training, organization and the purchase and maintenance of equipment.

The Department of Works and Buildings comprises

Graphic Outline of British Air Ministry



a Director of Air, Construction Service, a Director of Inland Works, a Director of Inland Construction, a Director of Marine Works, a Chief Electrical Engineer, a Chief Water Engineer, and a Chief Drainage Engineer, each in turn with large organizations under their control. This Department has charge of the construction of flying fields, hangars and factories, both for naval and military aeronautics.

The Inspector-General of the Royal Air Force is charged with the duty of enforcing all orders and commands of the Air Ministry.

Great Britain, it will be seen at a glance, has completely co-ordinated all aeronautics under this Air Council in contrast to the present American organization, whereby aviation is partly in the Post Office, partly in the War Department, partly in the Navy, and, so far as civil aeronautics are concerned, under no control whatsoever.

Success of Plan to Be Determined

Whether or not the British plan is the most successful that can be devised remains as yet to be determined. Despite the high praise given by the American Aviation Mission, the value of the Air Ministry in the development of commercial aviation is still problematical.

The American Mission in its report stated that "England realizes fully the importance of aircraft in the Military-Naval and Civil-Commercial aspects and proposes to encourage development of the air and has come to consider the dominance of the air as at least equal in importance with that of the seas

and is frankly planning a definite policy of aerial development to that end."

In its statement that "Great Britain recognizes the military value of aircraft," the Mission is undoubtedly correct. The construction of the Air Council is without question one aiming definitely at the development of war-time aviation. It has much the same fault as a Department of Aeronautics would have if constructed under the bills proposed by either Senator New or Representative Curry. It flavors too much of the military angle and too little of the civil and commercial requirements.

Is a Military-Naval Department

That the Department is chiefly one of a military-naval aspect is shown by the fact that almost all of the sub-departments are for the construction of military and naval fields and hangars, for the purchase of planes and other equipment for military-naval use, for the enforcement of military-naval air aviation orders and for the training and organization of pilots for the Army and Navy.

The Director-General of Supply and Research, whose department has not yet been fully completed, will have chiefly research duties entering into military-naval aviation. The Department of the Controller-General of Civil Aviation, whose duties have not yet been outlined, will be obliged under the construction of the Air Council to work in an atmosphere that is chiefly military or naval. It may or may not be hampered by having to depend on a department in charge of flying fields that works with a military perspective.

In fact, the success of commercial aviation in Great Britain under the Air Council is not yet established. It may be found the present organization is entirely unfitted for the development of civil aeronautics and

consequently the recommendation of the American Aviation Mission that this country should adopt a plan similar to that of Great Britain may be a trifle premature.

2000 Privately Owned Planes in This Country, Curtiss Says

DARK days for the American aircraft industry—and most of them have been sombre-hued since the armistice was signed—have not discouraged Glenn H. Curtiss, builder of the epoch-making NC planes and of numerous other types of army, navy and civilian flying craft.

With 90 per cent of the industry liquidated during the period following cessation of hostilities, with the working forces of his own plants reduced from nearly 20,000 to 2500, Curtiss sees a future for the industry, not only in serving the Government's needs for research and experimental production, but in meeting the rapidly growing demand for commercial aircraft.

Postal air service is here to stay, Curtiss points out, and predicts not only expansion of this work throughout the interior, but utilization of the seaplane for carrying mails along the coast and to islands within reasonable cruising distance of American shores. Development of the postal project alone will be a considerable factor in perpetuation of the industry, he says, and the present call for planes for pleasure purposes will be supplemented, later on, by their use for regular passenger and light express routes.

Curtiss depends upon the Government to provide the funds for development of aircraft design on a scale sufficient not merely to bring the art in America abreast of European progress, but to place the United States in the lead. These funds, in his opinion, should not have in the slightest degree the quality of a gift. The industry does not want a subsidy, he declares, but its need is for Government orders, supported by public funds, for constant research, experimentation and testing.

Adoption of such a policy, he says, would keep the engineering forces of the aircraft producers intact, enabling them to bring out new types of planes in sufficient numbers to meet the peace-time needs of the army and navy. At the same time American plans covering the latest departures in construction would be continuously revised up to date, furnishing the means, should a future war demand it, for immediate commencement, on a quantity production scale, of the making of American-designed craft.

Curtiss has confidence that the Government shortly will define its aircraft policy, establishing a system which will provide adequate development of military flying and place civil aviation under regulations applying throughout the country. In the latter sphere of activity, he says, must be provision for landing stations, on land and along the coasts,

these to be chartered and equipped with facilities for fueling and other forms of service.

With such accommodations, he points out, commercial flying, already assuming larger proportions than the average citizen imagines, will be given new impetus. He approximates the present number of privately owned aircraft in the country at 2000—all purchased since the armistice.

Of these, the land planes largely are used by former military aviators who carry passengers on pleasure trips, while a considerable number of seaplanes are owned and driven by men of wealth who find in them a new sport adjunct to their summer homes along the coast and larger lakes.

Curtiss classes the demand for pleasure aircraft as "by no means negligible" and declares it is growing steadily.

Citing tentative suggestions of the Post Office Department for establishment of seaplane mail routes from Florida to Cuba and along the Florida coast, Curtiss sees no reason why the project should not be carried out, and additional routes opened along the Atlantic and Pacific coasts.

No one can predict the future trend of aircraft construction, in Curtiss' opinion. There will be engine refinements, of course, and he believes, for the present, increase in lift capacity will be brought about by broadening, rather than lengthening, the wing spread, or by resort to triplane rather than biplane construction. He does not believe there is need of sturdier construction for the ordinary type of seaplanes, regarding them as capable of riding out the average ocean storm, in case they are forced to descend.

Destruction of the NC-1 and damaging of the NC-3, he declares, was wrought in a phenomenal storm, with a 60-mile gale and 30-ft. waves. However, to meet a similar possibility, designs for the projected new naval transatlantic fliers call for much larger hulls, with lifting capacity provided through a 160-ft. instead of 126-ft. wing spread and six motors instead of four.

Curtiss sees little likelihood of development extensively of the "triad," or land, air and sea plane. Craft of this type have been built, with a hull for alighting on the water and folding wheels ready to be used for landing, but they are "freaks" and except in rare cases travelers by air will adhere exclusively either to overland or over-water routes.

Limit of Propeller Tip Speed

SOME rather nonconcordant views regarding the limiting speeds of propeller tips have recently been advanced by British authorities. Thus Lord Weir, of the Air Ministry, said that the speed of sound in air (1050 ft. p. s.) should not be exceeded, but Dr. Leonard Bairstow in his recent Wilbur Wright lecture stated that experiments at the Royal Aircraft factory had shown that at about 900 ft. per second the nature of the flow from a propeller suffers a marked and striking change. Up to about that speed the usual strong breeze was felt in rear of the propeller,

but at higher speeds the slip stream disappeared, leaving a region of comparative calm behind the screw. On investigating the phenomenon more closely it was found that the flow above the critical tip speed was largely centrifugal instead of, as usual, resembling a jet of somewhat less diameter than the screw. As the speed rose through the critical value there was no sudden variation of power required to drive the screw, but it is obvious that at and above the critical speed the screw must become very inefficient as an organ of propulsion.

6,353,233 Cars and Trucks in Use in United States

Cars and Trucks in United States, July 1, 1919

ALL DUPLICATE REGISTRATIONS DEDUCTED

Ohio	464,826
New York	436,932
Pennsylvania	407,923
Illinois	401,371
California	349,734
Iowa	276,500
Michigan	273,396
Texas	249,346
Indiana	246,000
Minnesota	229,570
Wisconsin	212,490
Massachusetts	210,063
Kansas	206,033
Missouri	201,484
Nebraska	183,000
New Jersey	144,763
Washington	125,219
Oklahoma	124,501
Georgia	115,454
South Dakota	91,808
Colorado	88,315
Connecticut	85,200
Tennessee	84,000
Virginia	82,000
North Carolina	79,475
Maryland	75,590
Kentucky	75,259
North Dakota	73,015
Oregon	65,417
South Carolina	59,000
Alabama	55,402
Montana	53,420
Florida	48,598
Louisiana	46,150
West Virginia	45,019
Maine	43,656
Arkansas	43,238
Mississippi	39,399
District of Columbia	37,928
Idaho	35,817
Utah	30,760
New Hampshire	26,230
Rhode Island	26,112
Arizona	24,298
Vermont	22,094
Wyoming	18,200
New Mexico	16,875
Delaware	14,200
Nevada	8,153
Total	6,353,233

Increase of 407,791 registrations over the year end figures makes an average of one motor vehicle for each 19 persons in the country. Southern states lead in increases, while Ohio displaces New York with the largest number.

THE registration of motor vehicles for the first half of 1919 is 6,353,233, a gain of 407,791, or 6.85 per cent for the period. The registration Dec. 1, 1919, was 5,945,442.

The first six months of this year compares with the similar period of 1918 as follows: In that half year the gain was from 4,941,276 at the 1917 year end to 5,466,931, June 30, 1918, an increase of 525,665, or 10.63 per cent of vehicles in use. In all of these figures all duplicate registrations have been eliminated as completely as the forms of registration in force in the States will permit.

The most surprising single point brought out in tabulation of the half year figures is that Ohio displaces New York at the head of the column of the number of vehicles registered. For the last two years Ohio has reported a greater percentage of gain than New York, but no one was prepared to see that State forge ahead of its Eastern rival in the total.

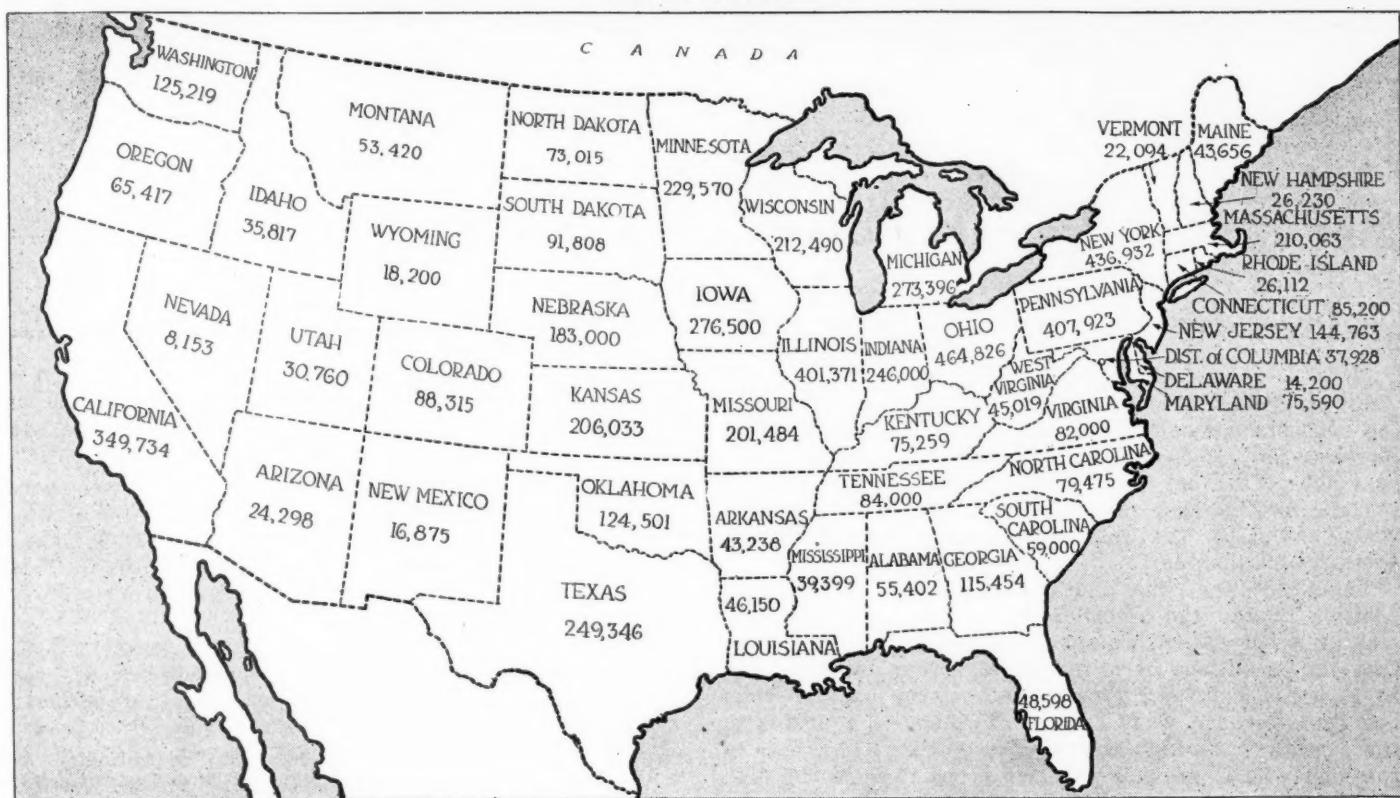
The figures will doubtless be surprising to two classes of persons. First, those to whom the difficulties of getting back into production loomed large in December of last year, when all industry was in more or less of chaos, and who have given much attention to the production interruptions, such as strikes, delays of Government settlements, insufficient supply of labor and housing difficulties, and other problems that the manufacturers have had to solve.

The other class is composed of those who did not read between the lines in the early-year production figures. Many of these will be disappointed at the showing.

But to other industries, the record written by the automotive industry in almost duplicating the record of a year ago will loom very large indeed.

Increase in Registration Dec. 1, 1918, to July 1, 1919

State	Increase in Cars	Per Cent Increase
Tennessee	19,000	29.23
Alabama	8,887	19.25
Louisiana	6,980	17.32
Georgia	16,494	16.63
Minnesota	30,306	14.87
Kentucky	9,375	14.22
Ohio	56,800	13.60
Virginia	9,772	13.52
Utah	3,556	13.07
Wyoming	2,050	12.69
California	38,890	11.53
W. Virginia	6,419	11.44
Colorado	8,315	10.39
Texas	25,726	10.28
N. Carolina	7,276	10.06
Delaware	1,245	9.58
Oregon	6,241	9.36
Missouri	17,674	9.31
Michigan	23,355	8.92
Massachusetts	16,566	8.56
Kansas	16,081	8.47
Indiana	18,840	8.25
Wisconsin	15,646	7.94
S. Dakota	5,687	6.60
S. Carolina	3,600	6.49
Illinois	21,236	5.45
N. Hampshire	1,326	5.32
Montana	2,700	5.28
Florida	2,379	5.05
Arizona	1,073	4.49
Washington	5,314	4.43
Nebraska	7,630	4.35
Arkansas	1,780	4.29
N. Jersey	7,441	4.15
Pennsylvania	13,951	3.54
Oklahoma	4,201	3.49
Vermont	518	2.29
N. Dakota	1,328	1.85
Maine	794	1.78
Dist. of Col.	619	1.30
Idaho	3,535	1.09
Maryland	854	1.09
N. Mexico	107	.06
Connecticut	298	.03
Iowa .....	...	...
Mississippi .....	...	...
Nevada .....	...	...
New York .....	...	...
Rhode Island .....	...	...
Total	451,775	
Average increase	7.12	

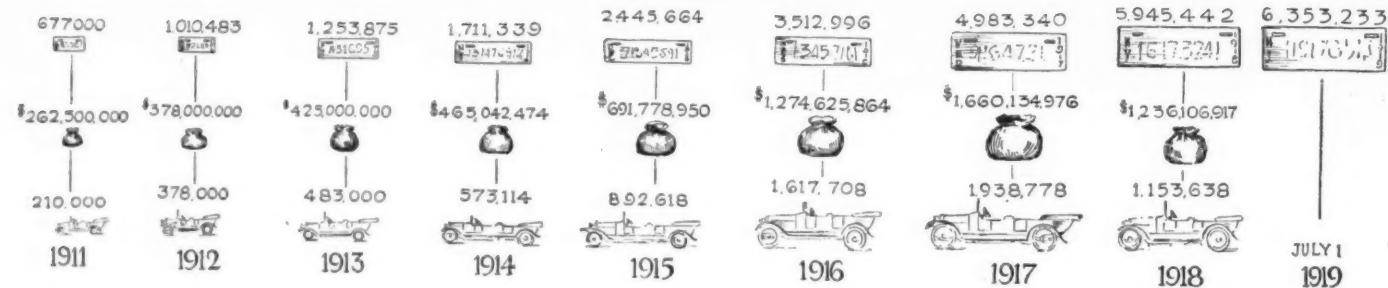


Distribution of cars and trucks in the United States, all duplicates being deducted

Registration of Cars, Trucks and Motorcycles, July 1, 1919

State or Territory	Gross Vehicle Registration	New Vehicle Registration	Registration up to Dec. 1, 1918	Gasoline Passenger Cars in Use	Gasoline Commercial Cars in Use	Electric Passenger Cars in Use	Electric Commercial Cars in Use	Motorcycles	Non-Resident Registrations**	Re-Registered***	Chauffeurs and Operators Registered	Total Fees
Alabama	55,042	8,887	46,155	.....	.....	.....	.....	1,031	.....	650	1,324	\$122,340
Arizona	24,943	1,073	23,875	.....	.....	.....	.....	498	.....	.....	150,549	432,280
Arkansas	43,233	1,780	41,453	.....	.....	.....	.....	18,256	.....	27,034	9,954	3,864,102
California	376,768	38,890	337,873	.....	.....	.....	.....	2,833	.....	.....	409,984	1,223,465
Colorado	88,315	8,315	80,000	.....	.....	.....	.....	3,350	.....	.....	100,585	254,534
Connecticut	85,209	298	84,902	.....	.....	.....	.....	550	.....	.....	16,600	7,371
Delaware	14,200	1,245	12,955	.....	.....	.....	.....	2,359	10,205	.....	1,173	369,391
District of Columbia	48,133	619	47,514	41,850	5,651	632	.....	1,212	.....	840	200	3,164
Florida	49,438	2,379	47,039	43,936	5,602	.....	.....	1,267	.....	.....	.....	370,879
Georgia	115,654	16,494	99,160	110,654	5,000	.....	.....	650	.....	.....	691	2,950,000
Idaho	35,817	3,535	32,282	.....	.....	.....	.....	8,157	.....	.....	4,998	1,395,213
Illinois	410,371	21,236	389,135	.....	.....	.....	.....	7,294	.....	500	43,000	2,500,000
Indiana	246,000	18,840	227,160	.....	.....	.....	.....	1,800	.....	.....	.....	1,039,589
Iowa	320,000	.....	327,500	.....	.....	.....	.....	4,712	.....	.....	.....	16,838
Kansas	206,033	16,031	189,952	.....	.....	.....	.....	1,123	.....	.....	543,550	240,900
Kentucky	75,259	9,375	65,884	68,115	7,144	.....	.....	425	.....	500	55,764	585,020
Louisiana	46,650	6,890	39,760	42,600	4,050	.....	.....	1,196	.....	3,410	10,806	1,314,469
Maine	45,366	794	44,572	40,599	4,767	.....	.....	1,621	.....	.....	155,049	2,051,498
Maryland	79,000	854	78,146	69,726	7,281	1,621	372	3,847	.....	.....	.....	2,166,402
Massachusetts	210,063	16,566	193,497	199,862	10,201	.....	.....	6,388	230	11,276	22,499	3,069,538
Michigan	284,902	23,355	261,547	254,227	30,675	.....	.....	5,924	.....	4,463	10,325	1,523,543
Minnesota	234,033	30,306	203,727	.....	.....	.....	.....	2,835	.....	18,007	1,036	78,798
Mississippi	39,399	.....	40,000	.....	.....	.....	.....	672	.....	150	1,036	371,461
Missouri	205,320	17,674	187,646	.....	.....	.....	.....	2,000	.....	.....	.....	329,000
Montana	53,750	2,700	51,050	.....	.....	.....	.....	103	.....	.....	.....	35,045
Nebraska	183,000	7,630	175,370	.....	.....	.....	3	2,004	.....	17,548	209,425	2,308,011
Nevada	8,153	.....	8,160	8,150	.....	.....	190	9,312	.....	125	10,690	96,570
New Hampshire	26,230	1,326	24,904	.....	.....	.....	190	1,467	101	.....	138,316	4,409,620
New Jersey	162,311	7,441	154,870	145,651	16,660	.....	15	2,053	2,546	.....	.....	434,913
New Mexico	17,000	107	16,893	.....	.....	.....	4,200	1,600	.....	.....	540,000	2,423,974
New York	439,478	.....	457,924	366,252	73,226	.....	19,000	3,100	.....	7,431	2,386	534,789
North Carolina	79,576	7,276	72,300	.....	.....	.....	21,107	1,513	2,519	25,117	70,398	4,392,236
North Dakota	73,015	1,322	71,687	73,000	.....	15	1,467	716	.....	.....	162,143	335,995
Ohio	474,209	56,800	417,400	470,000	.....	4,200	1,600	1,600	.....	.....	308,104	4,400,000
Oklahoma	124,501	4,201	120,300	.....	.....	.....	19,000	1,600	9,374	.....	846,470	2,045,000
Oregon	72,848	6,241	66,607	.....	.....	.....	2,997	1,600	1,600	.....	1,132,122	1,262,335
Pennsylvania	407,923	13,951	393,972	373,629	34,294	.....	2,997	1,600	1,600	601	974	1,311,811
Rhode Island	28,631	.....	30,595	23,081	5,550	.....	2,200	1,600	1,600	601	974	4,400
South Carolina	59,000	3,600	55,409	.....	.....	.....	1,106	1,106	1,106	601	974	76,000
South Dakota	91,800	5,687	86,121	.....	.....	.....	1,106	1,106	1,106	601	974	5,353
Tennessee	84,000	19,000	65,009	69,000	15,000	.....	2,000	1,600	1,600	601	974	2,203,810
Texas	275,927	25,726	250,201	.....	.....	.....	2,000	1,600	1,600	601	974	15,988
Utah	30,760	3,556	27,201	.....	.....	.....	2,000	1,600	1,600	601	974	4,400
Vermont	23,068	518	22,550	21,984	1,951	3	2,000	1,600	1,600	601	974	2,045,000
Virginia	82,000	9,772	72,228	.....	.....	.....	2,000	1,600	1,600	601	974	5,353
Washington	125,219	5,314	119,905	.....	.....	.....	2,000	1,600	1,600	601	974	2,203,810
West Virginia	45,019	6,419	38,600	.....	.....	.....	2,000	1,600	1,600	601	974	5,353
Wisconsin	212,490	15,646	196,844	203,650	8,840	.....	2,000	1,600	1,600	601	974	80,872
Wyoming	18,200	2,050	16,150	.....	.....	.....	2,000	1,600	1,600	601	974	.....
Total	6,537,256	451,775	6,113,099	2,625,866	235,892	6,474	372	174,098	13,778	161,425	987,308	\$50,196,118

NOTE—Steam cars and trucks are included with the gasoline vehicle figures, as segregation is not carried out by registration officials. **Number of vehicles owned by citizens of other states. ***Number of vehicles re-registered owing to change of ownership, transfer, etc.



Top line shows registration, center line indicates value of production and lower line the total number of cars and trucks produced in each year

An analysis of the gains for the half year show that the Southern agricultural States are showing the greatest increase, as compared with Mississippi Valley States a year ago. The fact that agricultural States are showing the greatest increase remains true, as it has for several years, except for the isolated war period increase in the District of Columbia.

The position of the South is not unexpected, as the position a year ago tended to show that the South was making great gains. It appears to be a fair conclusion that the small Southern farmer has been more willing to turn his increased revenue into motor vehicles than has the Northern wage earner. Perhaps this is due to the fact that the high cost of living brings less fear to the man who is growing his own crops than to the man who must provide for his family at the corner grocery.

Here are the increases for the two periods:

	Increase 1919 Per Cent	Increase 1918 Per Cent
Tennessee	29	11
Alabama	19	36
Louisiana	17	6
Georgia	16	23
Kentucky	14	21
South Carolina	6	26
Arkansas	4	35

With the solitary exception of the District of Columbia, with an abnormal wartime increase of 74 per cent last year, Alabama headed the list of percentage gains. Now Tennessee is in the lead. The District of Columbia has dropped to 1.30 per cent gain.

There are a number of reasons why the Southern States should take a prominent position in registration at this time. The South is prosperous, diversified crops have largely taken the place of the staple cotton, roads are being improved on a systematic basis, and it is conceivable

that car and truck manufacturers have endeavored to divert all possible products southward in the desire to permanently extend the scope of sales campaigns.

Another reason is the development of the Southern automotive dealer. It has been said with truth, in the past, that south of Mason and Dixon the average dealer lacked the go-aheadness of his more northerly brother. This is no longer the case; the Southern dealer and distributor are live wires.

Turning to the Middle West, including the corn belt, we find, generally speaking, that the percentage gains are in the agricultural States rather than in those which have large industrial populations. For example, Ohio, in the latter category, has dropped from 24 per cent in 1918 to 13 per cent this year; Indiana shows no change at 8 per cent, and Michigan is slightly better with a 9 per cent increase against one of 7 per cent last year. Wisconsin and Illinois show slight losses.

On the other hand, Minnesota, a mineral and grain-producing State, shows a gain of 14 per cent as against an actual loss in 1918.

Last year Iowa showed a gain of 17 per cent, and, moreover, headed the table showing the number of persons per car. This year she shows a loss in registration and drops to third place in the population per car table.

These two States are typically indicative of the difficulty in determining the extent to which local conditions affect car sales. Both are extremely prosperous, and have practically no limit to their car-purchasing possibilities. Yet we get diametrically opposite results. There is always the possibility that a more energetic chain of distributors and dealers can swing more than their share of cars and trucks, and for want of a better reason this may be adopted as having a bearing on existing conditions.

In the grain belt proper Kansas has dropped from a 16 per cent increase in 1918 to one of 8 per cent this year.

Registration and Population July 1, 1919

Dealers, Garages, Machine Shops and Supply Houses in Operation

State	Dealers	Garages	shops	Repair- Jobbers	Cos. Hav- ing Exclu- sively	Supply Depts.	Totals	Cos. Hav- ing Exclu- sively							Supply Depts.	Totals	
								Repair- Jobbers	Dealers	Garages	shops	Repair- Jobbers	Cos. Hav- ing Exclu- sively	Supply Depts.	Totals		
Alabama	201	122	80	1	15	57	476										
Arizona	125	128	61	..	6	44	364										
Arkansas	269	207	83	1	11	59	630										
California	1,433	1,457	965	18	78	464	4,415										
Colorado	398	396	181	3	14	127	1,119										
Connecticut	409	474	294	7	32	152	1,368										
Delaware	66	74	32	..	4	24	200										
Dist. of Col.	61	43	31	2	11	13	161										
Florida	251	307	159	2	13	97	829										
Georgia	560	465	205	1	25	128	1,384										
Idaho	179	164	72	1	7	72	423										
Illinois	2,127	2,163	1,095	18	75	608	5,986										
Indiana	1,009	937	435	10	37	278	2,706										
Iowa	1,685	1,576	688	9	38	621	4,617										
Kansas	1,013	977	497	8	18	265	2,718										
Kentucky	356	302	115	3	17	69	862										
Louisiana	211	136	73	3	13	33	469										
Maine	331	341	160	3	8	128	971										
Maryland	259	267	140	2	16	79	763										
Massachusetts	763	975	459	14	67	241	2,519										
Michigan	1,095	1,095	444	7	46	302	2,989										
Minnesota	1,070	935	513	14	35	319	2,882										
Mississippi	166	244	76	..	4	52	512										
Missouri	932	802	336	17	44	240	2,371										
Montana	281	280	134	8	6	92	801										
Nebraska	963	817	318	12	9	234	2,353										
Nevada	56	59	35	..	2	22	174										
New Hampshire	177	231	117	..	3	90	618										
								Total	30,987	30,290	14,377	283	1,337	9,380	83,800		

South Dakota shows a falling off from 16 per cent to 6 per cent. On the other hand, Texas, primarily a cotton and cattle-producing State, has gained 10 per cent as against a loss in 1918. This gain should probably be ascribed to the oil field developments in Texas, as both the cattle and cotton sections of the State were hard hit last year by drouth and the pink boll worm. These sections have not yet had an opportunity to recover. The losses there, however, have been more than offset, as far as motor-vehicle figures are concerned, by the oil boom in the Fort Worth section, where the demand for heavy cars has not at any time been met despite the heavy offering of used cars from other sections. The neighboring State of New Mexico shows a microscopic gain against one of 12 per cent last year.

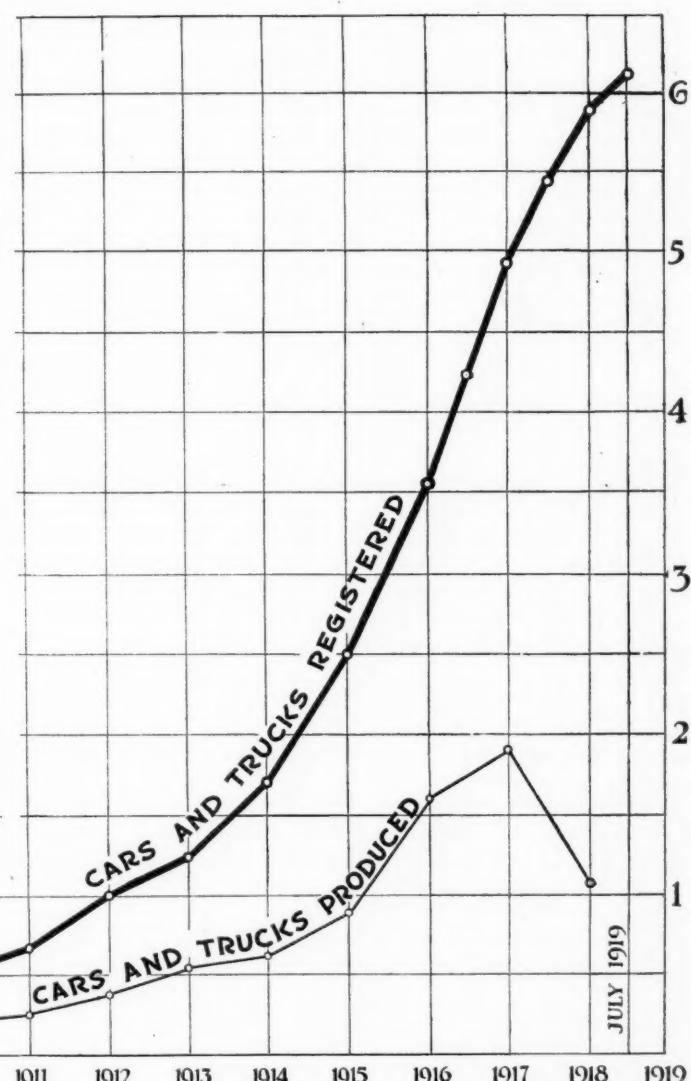
Wyoming, Utah and Colorado practically maintain their last year's rate of increase, the latter State gaining a little, the others losing slightly. The Pacific Coast States all show losses, California dropping from 24 per cent in 1918 to 11 per cent in 1919. Oregon falls from 17 to 9 per cent, and Washington from 7 to 4 per cent.

A comparison of the gains of the populous industrial States of the Atlantic Coast shows the following results:

	Increase 1919 Per Cent	Increase 1918 Per Cent
Massachusetts	8	..
New Jersey	4	..
Pennsylvania	3	6
Connecticut	.03	1
New York	..	2

Any attempt to draw conclusions based on the percentage of registration gain as between the North and South, the East and West, the agricultural and the industrial States, would appear to be futile, owing to the absence of any definite line of demarcation governing local economic conditions. The country is prosperous throughout

its length and breadth, but it is handicapped in sections by uneven distribution of labor and by problems attendant on the resumption of normal post-war business.



Registration and production curves showing the development year by year from 1903. The former has risen steadily and consistently, but the production curve has been somewhat irregular

It is to these difficulties that the real cause of the reduction in the total of new registrations is due. Insufficient production to meet current demand, and unequal distribution of the cars and trucks produced, no doubt account for variations which are otherwise unexplainable. Demand exists everywhere, and some months must elapse before production is anywhere nearly sufficient to meet it.

In considering the new registrations on a percentage basis, the fact that the smaller available production has restricted expansion should be taken into account. It is reasonable to assume that had production been sufficient to meet demand the increase for the past six months would have been 'way ahead of that for the first six months of 1918.

Nebraska returns to place one at the top of the column of the table of cars to population, there being one car in that State to each 7.08 persons, the decimal being necessary to determine the rank of several States by this comparison. Iowa held that position last year to one car to each six persons, and this year the proportion in that State is one car to each 8.04 persons. Iowa's position is probably explained in part by the influx of wage earners into certain centers.

A study of Nebraska and Ohio will be interesting to those who like to draw conclusions from figures. Nebraska has the largest number of cars in proportion to population. Ohio registers the largest number of cars. Nebraska is well defined as a progressive agricultural State. For all practical purposes there is no other source of wealth in that State except the soil. The States ranking next to Nebraska also are agricultural States, coming in this order: South Dakota, Iowa, California, Kansas, Montana, then the District of Columbia, which can be ignored as to classification, Minnesota, Wyoming, North Dakota, Arizona, and then Ohio, with one car to each 11.34 persons. Ohio is the first State with a heavy industrial interest to appear in this list. She has, perhaps, as well balanced interest as any State in the Union. There are two large centers of population, with many minor cen-

DISTRIBUTION OF CAR, TRUCK, TRACTOR AND ENGINE MANUFACTURERS IN THE UNITED STATES AND CANADA.

State	Cars	Trucks	Tractors	Engines	Total
Alabama	1	..	1	..	1
Arkansas	1	12	6	..	19
California	2	2	..	..	4
Colorado	1	2	2	2	7
Connecticut	1	..	..	..	1
Dist. of Columbia	..	1	..	..	1
Georgia	1	2	..	..	8
Illinoi	16	40	27	4	87
Indiana	20	13	10	5	48
Iowa	..	7	11	1	19
Kansas	1	2	2	..	5
Kentucky	1	2	..	..	3
Louisiana	1	2	..	..	3
Maine	..	..	1	..	1
Maryland	1	1	..	..	2
Massachusetts	3	9	4	..	16
Michigan	34	53	19	18	124
Minnesota	4	8	25	2	39
Missouri	6	7	7	..	20
Nebraska	1	3	2	..	6
New Hampshire	1	..	..	..	1
New Jersey	1	7	..	1	10
New York	15	29	8	9	61
North Carolina	..	2	..	..	2
North Dakota	..	..	1	..	1
Ohio	25	32	19	5	81
Oklahoma	3	2	1	..	6
Pennsylvania	6	25	6	7	44
Rhode Island	..	1	..	..	1
South Carolina	1	..	..	..	1
South Dakota	..	2	..	..	2
Texas	2	3	2	..	7
Virginia	2	1	1	..	4
Washington	2	5	1	..	8
West Virginia	1	1	..	..	2
Wisconsin	4	12	17	8	41
West Indies	1	1	1	..	3
Canada	10	10	2	..	22
Total	167	300	176	62	706

ters of industrial importance. There also is a heavy agricultural interest, with a ready and available market for all products. Ohio often is referred to as a typical American State. Closely following Ohio in the list come a number of States with more or less equally balanced industrial and agricultural interests, until Connecticut, twenty-second in the list, is reached. This industrial State has one car for each 15.09 persons, and heads the list of States of that interest.

Carbureter with Electric Heating

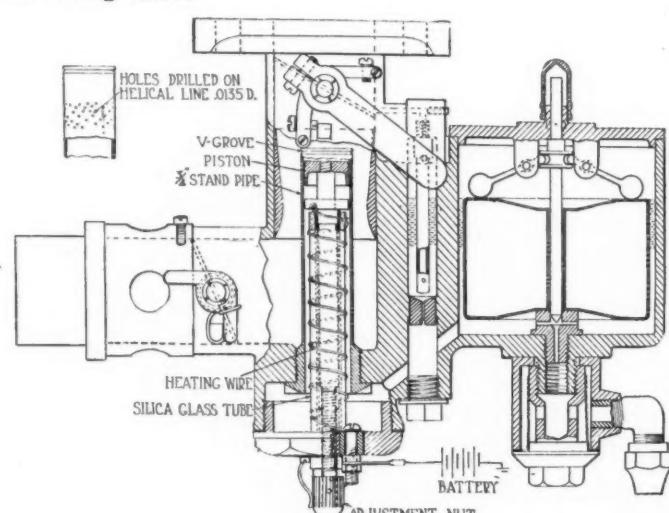
THERE are two noteworthy features in the Columbia carbureter, a Chicago product designed particularly for handling heavy fuels. One is that instead of the usual spray nozzle there is used a stand-pipe $\frac{3}{4}$ in. in diameter, in the wall of which near the top are drilled a comparatively large number of very fine holes through which the fuel is sprayed. The holes are drilled on a helical line and in automobile size carbureters are 0.0135 in. in diameter, and from 18 to 36 in number. Within the stand-pipe near its upper end is a sort of piston, the height of which can be varied by means of an adjusting nut at the bottom of the carbureter and thus the effective fuel jet area varied.

At the top of the stand-pipe a V groove is cut around the circumference which is claimed to perform an important role in the action of the carbureter. The liquid fuel leaves the stand-pipe in very fine streams, and it is immediately picked up and carried upward by the air current. The V groove tends to make it spread out into the air channel and thus to be thoroughly broken up.

Inside the nozzle is a heating unit, composed of monel metal wire, with a resistance of about 1.5 ohms. When connected to the lighting circuit it will consume about 4 amperes. This wire is wound in spiral form around a silica glass tube. Silica glass has a coefficient of expansion equal to zero, and therefore is not subject to breakage by heat. When connected to the battery this wire

becomes red hot if in the open air, but when surrounded with fuel the heat is immediately absorbed by the gasoline, which boils away.

There is an idling passage between the float chamber and the main jet which is merely a by-pass around the throttling valve.



Sectional view of Columbia carbureter

Story of Origin of the Hotchkiss Drive

The Hotchkiss drive is the subject of many arguments and it is interesting to know its origin. Mr. Bradley tells how the first car so fitted was built in an American factory in France and that it was designed by Georges Terrasse, a French engineer, in 1904. Terrasse, strange to say, came from a factory which supported the chain drive.

By W. F. Bradley

PARIS, Aug. 7.

THE first automobile to be built without radius rods or torque member came out of the Hotchkiss factory at St. Denis, near Paris, in 1904, and was exhibited in the Paris automobile salon of the same year. In 1875 Benjamin B. Hotchkiss, an American citizen, came to France and established the Hotchkiss gun factory. It was not until 1903 that this company built an automobile, the design of which was in the hands of Engineer Georges Terrasse, who had received his technical education in the French schools and his practical automobile experience at the Mors factory.

As an ex-Mors engineer, Terrasse was naturally influenced by practice in those shops. At that time there were two distinct schools, interested respectively in chain and shaft drive. Although Mors was then a strong supporter of the chain, the first car built by Terrasse for the Hotchkiss company was designed with shaft drive. This car had a four-cylinder engine of 105 by 120 mm. bore and stroke, and was very much criticised at that time by reason of the high power it was proposed to transmit by means of cardan shaft. At that time Renault was the leading maker of shaft-drive cars, but he did not dare attempt to use an engine of anything like the same size and power as the one Hotchkiss was then putting in his cars.

The first car to be built by Hotchkiss, while having radius rods, did not have any torque member. The rear suspension was platform type. In 1904 a car was built and put on exhibition at the Paris show with the system now known as the Hotchkiss drive. The cars were in production for 1905, and have not changed, so far as this feature of the design is concerned, since that year. Engineer Terrasse was convinced that the springs could be made to fulfil the three functions of suspension, propulsion and reaction. This car, which had a wheelbase of 116 inches, was fitted with springs having the unusual length (for that period) of 51 inches and a width of 2 inches. This was also the spring width of the previous year's car, with platform springs and radius rods. It was immediately discovered that the suspension was unsatisfactory and after a few cars had been turned out with this width of spring the number of leaves was decreased and the width increased to 2.5 inches. This was an exceptionally wide

spring for that period, being very greatly in excess of the width adopted by any other maker.

Georges Terrasse was the first to discover that satisfactory results with the Hotchkiss drive and good suspension could only be obtained with very long broad springs, having a small camber. At that period springs were short and narrow and had a comparatively large number of leaves. It was not until later that the advantage was perceived of making the springs as thin as possible and increasing the number of leaves.

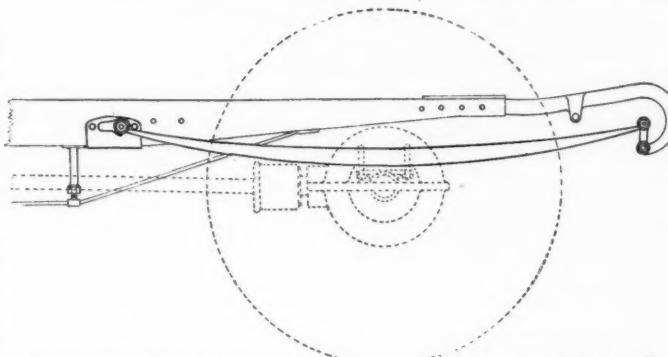
It was predicted that there would be universal joint trouble and spring breakage with the Hotchkiss drive. None of these troubles materialized, and after the first increase in the width of the springs the system remained entirely unchanged on the Hotchkiss cars from its adoption in 1904 to the present date.

Some time after Hotchkiss began to use this drive other French firms adopted it with the sole object of cheapening construction. They had no thorough knowledge of the subject, and this tended to bring discredit on what is now recognized to be a most valuable system. Faults were prevalent on Hotchkiss-drive cars which were unknown on the original Hotchkiss car.

It has to be admitted that this system of design, which is now appreciated at its full value, attracted comparatively little attention in 1904. At that time engineers were discussing whether cars should be driven by shaft or by chain.

Renault led the former group, with cardan shaft and direct drive; on the latter principle he secured a patent and for a number of years exacted substantial royalties from all European manufacturers. Mercedes, Panhard and Mors were the leaders in the chain drive school. De Dion-Bouton was an outsider with his system of transverse cardan shafts, which he claimed had all the advantages of both without any of their disadvantages. This controversy was so keen that the Hotchkiss drive was introduced without much attention being paid to it.

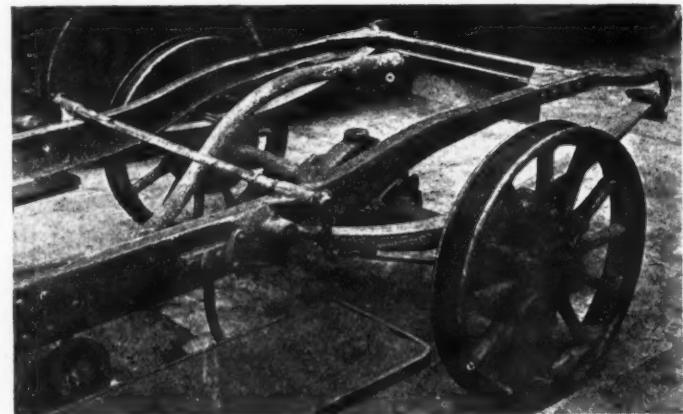
Apparently the Hotchkiss people themselves did not appreciate their invention at its full value. They never advertised this feature, and, unlike Renault with his direct drive, they did not seek patents and royalties. Credit for the invention first came from America, where the term "Hotchkiss drive" was originated. It is rather curious to



Chassis assembly drawing of the first automobile to be built with the Hotchkiss drive. This car was produced in 1904 and shown at the Paris salon of that year. Rear springs are shown 1.9 inches wide; these were increased shortly afterward to 2.5 inches



The first Hotchkiss car, built in 1903, had long radius rods and platform springs



The first car to be built with the Hotchkiss drive. It was produced in the Hotchkiss factory in 1904

note that neither in France nor in England is the designation "Hotchkiss drive" known to the motoring public. In the latter country the term "spring drive" is used, although this does not by any means cover the invention of Georges Terrasse as first applied to Hotchkiss cars. In France the Hotchkiss drive is rather laboriously deferred to as "drive and reaction by means of the springs."

Although the Hotchkiss engineers are convinced that their system is the most rational one, particularly on vehicles having a low ratio of dead to useful load (this covers all passenger vehicles), they have never maintained that the mere abolition of the radius and torque members and the adoption of two universals would give perfectly satisfactory results. Some makers have overlooked this and have adopted a Hotchkiss drive which by reason of the design of the springs or their attachment to the axle was bound to give trouble. A certain number have failed by reason of excessive spring camber, which is incompatible with the Hotchkiss drive and unsatisfactory on any automobile.

The adoption of the Hotchkiss drive on European cars has been rather a slow operation. It is curious to note that it was frequently adopted on racing cars before the same firms used it on touring cars. There is an example in Delage, who has built all his racers with Hotchkiss drive, but has adopted it for touring cars only in comparatively recent years. The same applies to Peugeot, who has never built a successful racing car without the Hotchkiss drive,

but even now has not adopted this system for the whole of his touring models.

Another example is to be found in Fiat. This Italian firm, in common with all others in that country, started under the influence of German design and has always had central drive with a single universal joint. Yet the latest Fiat racing cars have Hotchkiss drive, and they certainly hold the road better than any other racing product from that factory.

It is worth noting that at the last French Grand Prix race all the cars with the exception of the German had Hotchkiss drive. This refutes the contention made in a paper read recently before the Buffalo Section of the S. A. E. that a vehicle equipped with a torque rod may safely be operated at a somewhat higher speed than others without this member. Racing experience, however, does not prove that only vehicles with Hotchkiss drive hold the road well. In the last French races the Mercedes cars without Hotchkiss drive were not in any way inferior to the French, Italian and English machines with this system.

The tendency in Europe undoubtedly is more and more toward the Hotchkiss drive. Whereas ten years ago there were half a dozen variants in use, practically all can now be put into one of two classes: (1) cars with Hotchkiss drive; (2) cars with central drive, of which the Fiat is the best known example. In this case the springs are shackled at both ends and the drive and torque are taken through a yoke attached to a heavy transverse frame.

Thermo-Electric Pyrometers

THE question of a satisfactory base-metal couple still remains to be solved. While it is quite true there are a good many base-metal couples on the market which are suited for the comparatively low temperatures up to 800 deg. and 900 deg. Cent., for temperatures above 1000 deg. Cent. there is still nothing to compare with Le Chatelier's original platinum and platinum rhodium element. While supplies of these metals are available, there is nothing serious about this; even at present prices this couple pays for itself in the regularity of the heat-treated products. The fact is, however, that platinum is becoming more and more scarce, the price continually rises, and it is within the bounds of possibility that there may not be enough of these metals available for pyrometry—a serious prospect, having in view the large amounts which are being used for this purpose.

Dr. Burgess, of the Bureau of Standards, asserts

that base-metal couples are being successfully applied in America.

There are a number of quite excellent pyrometers on the market described as portable pyrometers. One is well advised, however, to take as little advantage of their portability as possible; there should be an instrument for each furnace or group of furnaces. Moving these delicate instruments about the works, to say the least, does them no good, and further, the calibration varies with the surroundings and the leveling.—*The Engineer*.

A BULLETIN has been issued by the Wellman-Seaver-Morgan Co. showing in three charts the relations that exist in any power transmitting shaft between the horse-power transmitted, the shaft diameter, the torsional stress and the speed. Copies will be sent upon request.

Supplemental Springs for Metal Tired German Trucks

PART IV

The close relationship between tires and springs is the big point brought out in this article on the German Army trucks. Colonel Slade found the regular spring equipment of the trucks rather formal, but the supplemental springs, which were added to the equipment when the supply of rubber for tires was exhausted, have supplied a topic of much interest.

By Lieut.-Col. Arthur J. Slade

THE German trucks are in every case equipped with semi-elliptic springs both in front and rear. The original mounting was conventional, though not uniform. That is to say, while the springs were hung by the familiar types of shackles, the latter varied in length, detail, design and method of attaching to frame, in some cases the shackles being normally in compression and in other cases in tension.

The spring hangers in general showed no special originality of design with the exception of the type used on the Eisenach. The portion of the hanger to which the shackles are attached swivels on a pivot bolt, thus relieving the springs of some of the strains caused by frame distortion.

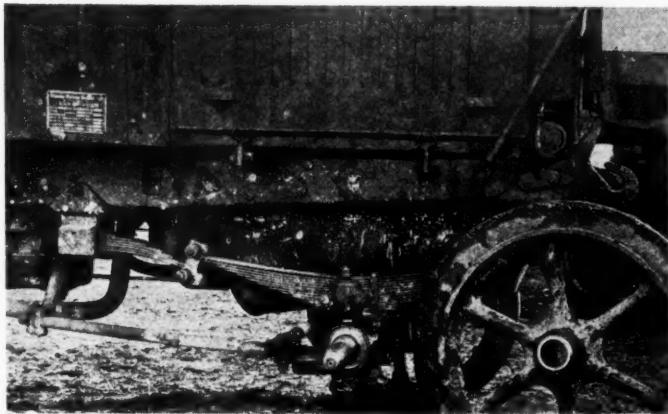
The springs, as a rule, are but slightly cambered, providing a nearly flat spring when under load, and very gen-

erally the leaves are provided with longitudinal grooves, insuring their maintaining a proper position with relation to one another. The leaves are narrower than is customary in American practice, though the lengths and thickness are not unusual.

The table below shows the general spring dimensions of the several makes.

The supplementary springs found on many of the trucks are made necessary on account of the substitution of steel for rubber tires. The exceptions include the Daimler and Benz front springs, which are provided with a quarter elliptic spring rigidly clamped to the frame at its rear end and at its forward end shackled to the rear end of the conventional semi-elliptic spring, shown in sketch and photo.

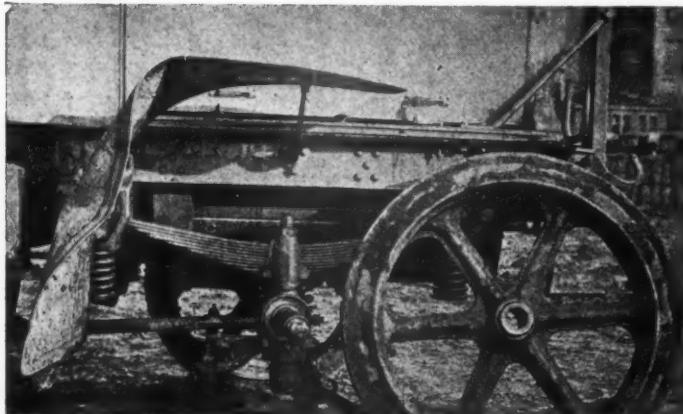
The Bussing, on its 4-ton model, is known to have employed supplementary spiral springs at front and rear



Quarter-elliptic spring construction on the 5-ton Daimler

Spring Dimension Table
(Measurement in inches)

Truck	Length	Front Width	Leaves	Length	Rear Width	Leaves	Truck	Length	Front Width	Leaves	Length	Rear Width	Leaves
Adler	42	2	8	55	2 1/4	11	Hering	39 1/2	2 1/8	8	56 1/2	3 3/16	10
Arbenz (shaft) ..	46 1/2	2 1/4	6	52	2 1/4	11	Horch (shaft) ..	39	2 1/4	11	54	3	11
Arbenz (chain) ..	47 1/2	2 1/8	8	52	2 1/4	12	Horch (chain) ..	46	2 1/4	9	48	3 1/8	10
Audi 2T	35 1/2	2	10	46 1/2	2 1/8	12	Komnick 4 1/2T ..	44	2 1/4	9	55	3 1/8	16
Benz 4 1/2T	47	3 1/8	10	54 1/2	3 1/8	11	Komnick 3 1/2T ..	36	2 1/8	7	55	2 1/4	15
Benz 3 1/2T	43 1/2	2 1/8	9	55 1/4	2 1/4	10	Lue	36	2 1/4	9	55	2 1/4	14
Bergmann	39 1/2	2 7/16	11	56	3 3/16	13	Mulag 3 1/2T ..	50 1/2	2 1/8	11	50 1/2	3 1/8	13
Bussing 2 1/2T ..	43	2 1/8	9	57 1/2	2 1/4	11	Mulag 4 1/2T ..	50 1/2	2 1/8	11	50 1/2	3 1/8	13
Bussing 4 1/2T ..	41	2 1/4	9	50 1/2	2 1/4	10	Nacke	35	2 1/4	10	55	2 1/4	10
Daag	40	2 1/4	10	52	3 1/8	13	N.A.G. (chain) ..	43	2 1/4	6	56	3 1/4	13
Daimler 3 1/2T ..	39 1/2	2	12	58 1/2	2 1/4	11	N.A.G. (shaft) ..	42	2 1/4	7	49	3 1/4	13
Daimler 5T	40	2 1/4	13	59 1/2	3 9/16	13	Opel 3 1/2T	37	2 1/4	9	55	2 1/4	10
Daimler 2 1/2T ..	40	2 1/4	13	59	3 1/2	13	Opel 2T (shaft) ..	35 1/2	2 1/8	7	49	2 1/4	10
Dixi	35 1/2	2 1/4	8	51 1/2	3 1/8	10	Podens 3 1/2T ..	43	2 1/8	8	55	4	10
Durkopp	47 1/2	2 1/4	11	58 1/2	3 1/2	12	Pokorny	52 1/2	2 1/4	11	54	3 1/8	13
Dux	41	2 1/4	10	59 1/16	4	9	Presto 2T	35 1/4	2 1/4	6	52	2 1/4	9
Carl Schmidt ..	40 1/2	2 1/4	8	55 1/2	3 1/2	9	Stoewer 3 1/2T ..	39	2 1/2	8	51 1/2	3 1/4	10
Eisenach	40	2 1/2	8	58	3 7/8	10	Stoewer 4 1/2T ..	39 1/2	3	7	52 1/2	3 1/2	9
Gräf & Stift ..	39 1/2	2 1/8	8	47 1/4	2 13/16	10	Union	39 1/2	2 1/8	8	60	2 1/8	12
Hansa-Lloyd ..	43	2 1/8	9	55 1/8	3	15	Vomag (chain) ..	41 1/4	2 1/4	11	49	3 1/2	16
Heinr. Ehrhart ..	40	2 1/8	10	52 1/2	2 1/4	12	Vomag (shaft) ..	43	2 1/8	11	59 1/2	3 1/4	14
Hercules	40	2 1/4	7	54	3	12							



Supplementary spiral springs at front and rear ends of Bussing semi-elliptic front spring

ends of its semi-elliptic front springs previous to the war, and this construction may be noted in the photograph.

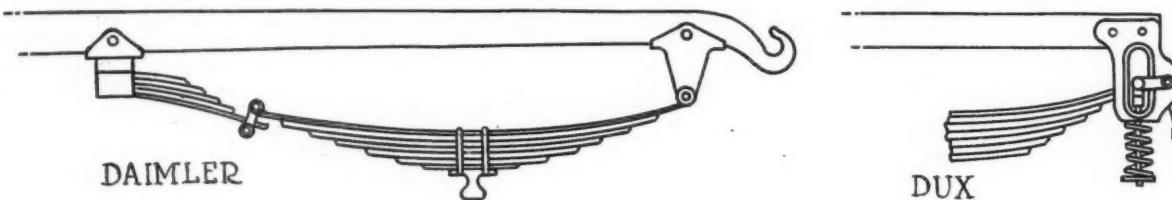
The reason for applying supplementary springs so generally when the supply of rubber tires became practically exhausted in the German motor transport service was because it was found that, with the original spring suspensions, the vibration due to the use of steel tires was so great that not only were engines and other units loosened from their mountings, resulting in serious injury as well as deterioration in their parts, but the frames developed



Supplementary spiral spring at rear of the front spring on the Daag truck

made by German officers to the effect that wheel failures were not included in the numerous difficulties encountered in the operation of the German motor transport, and it is believed that the results of vibration were confined to the chassis, though it will be noted in a subsequent article that wheel bearings of the bronze sleeve type are more prevalent than those of the ball-bearing type, and it is entirely possible that wheel bearing design was affected by the steel tire question.

The various adaptations of the spiral supplementary



breakages which could be attributed to no other cause than vibration.

The reduction of the speed of the vehicles to 6 or 8 miles per hour, accomplished by changing the driving gear ratios, failed to overcome this trouble, and the problem was presented to the various truck manufacturers for solution. The use of supplementary springs appears to have been the solution arrived at, though it is not known what other expedients may have been tried.

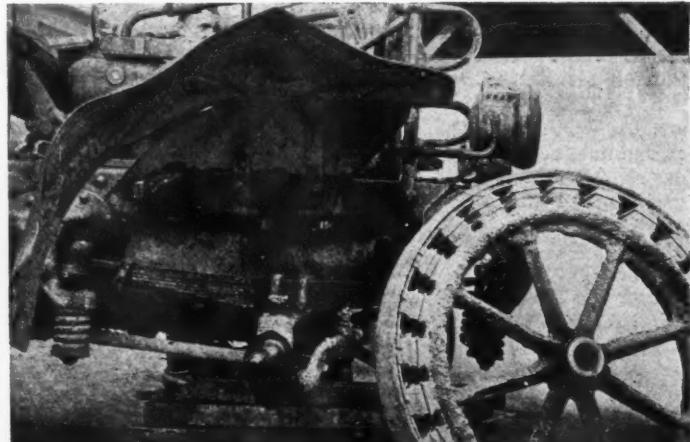
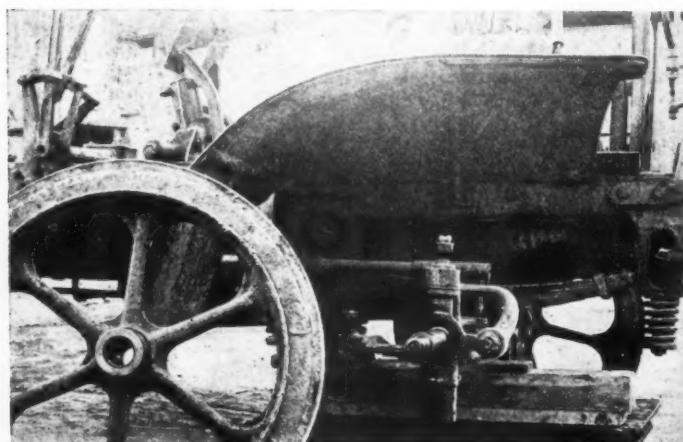
It could not be learned whether the steel tires had any deleterious effect on the truck wheels, but statements were

spring are well illustrated in the following examples:

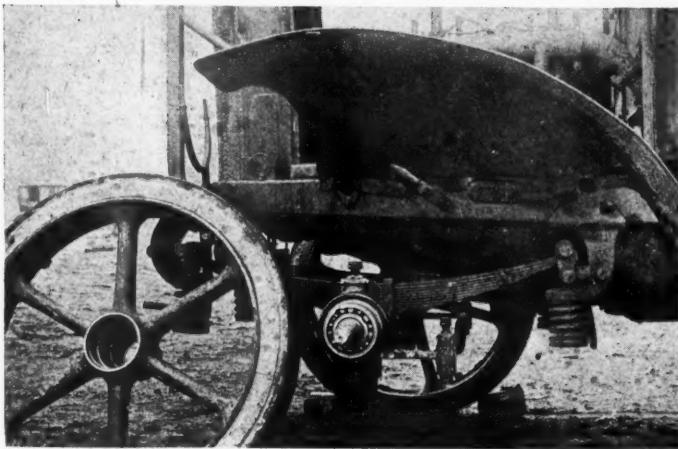
The Daag utilizes this device at the rear end of the front spring only, and, as will be observed in the photograph, no alteration of the spring hanger is necessary.

The Dux is equipped at both forward and rear ends of the front spring, the rear spring suspension remaining unchanged. The photograph and sketch on this page show how the application is made by use of new spring hanger brackets, the same construction being employed at both ends of the spring.

On the Hansa-Lloyd a not dissimilar construction is



The Dux and Hansa-Lloyd trucks are equipped with supplementary spiral springs at both the front and rear ends of the front springs



Spring construction on the Bergmann truck, showing supplementary springs

used at each end of both the front and rear springs.

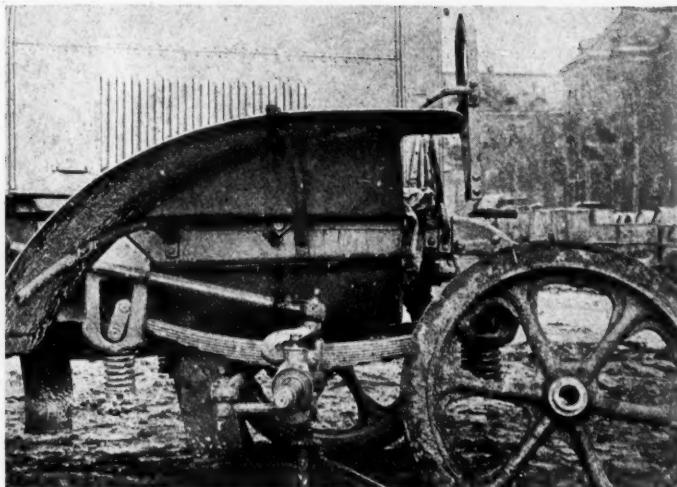
The Bergmann has almost identically the same construction as the Hansa-Lloyd, and can be seen very clearly in the photograph.

The 3½-ton Hering has a similarly mounted spiral at rear end of the front spring, and the 4½-ton truck of the same make uses the same construction at both ends, but in neither of these models is any alteration found in the springing at the rear.

On the Komnick 4½-ton the same principle is applied at both ends of front spring, using a rather clumsy type of bracket, as shown in photograph. On the rear of this model no change has been made, and on the 3½-ton Komnick no supplementary springs are used either front or rear.

The Mulag has a crude adaptation of the same idea and one that is very vulnerable to injury as applied at forward end of front springs, and which may be seen in the photograph.

The Luc, at the forward end of front spring, employs a vertical spiral mounted on the same principle as those previously referred to, but at rear of front spring employs a construction in which the spiral spring is horizontal, and



On the 4½-ton Komnick the same principle is applied at both ends

the construction of which is indicated in the photograph and sketch. The rear spring on this model remains unchanged.

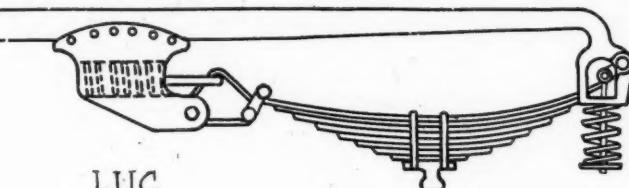
The 3½-ton chain drive Horch has no change in its springing, either front or rear, while the shaft-driven model of the same make and capacity has horizontal spirals at both ends of front spring, enclosed in horizontal cylindrical guides having provision for adjustment at the end.

This is evidently a very recently designed model and contains a number of quite unusual features of construction, one of which is the oil reservoir lubricating system for its spring shackles. These can be seen in the photograph of the side

view of this truck, as well as in the photograph of the front spring mounting.

The Nacke also has enclosed spirals at both ends of front spring, as may be seen in the photograph. They appear to be of an unnecessarily elaborate construction, on contrast with other features of this model, in which some effort toward simplicity of design is apparent.

The Podeus has a coiled spring held by the spring V bolts between the front spring and its center and the chassis frame.



LUC



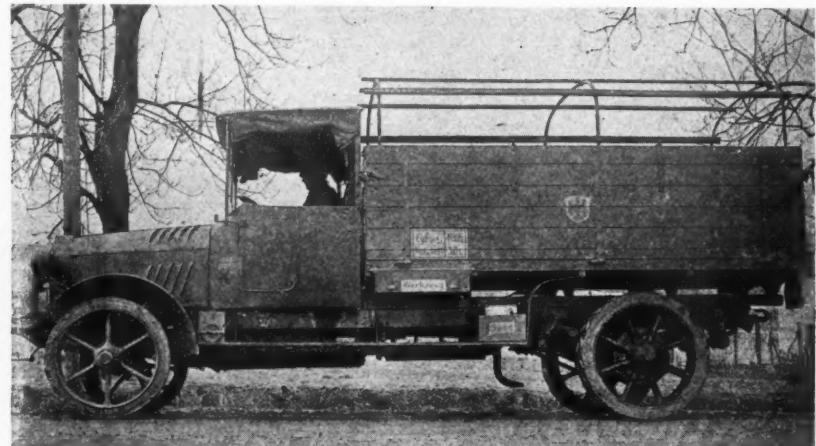
Supplementary spring construction on the Mulag



Vertical spiral mounted at the forward end of the front spring on the Luc truck



Spring construction on the 3 1/2-ton Horch



Horch 3 1/2-ton chain drive truck

The N. A. G. has a flat coiled spiral attached both to frame and spring bolts.

Several other makes have applications similar to one or another of those already described, but by no means all of the trucks are equipped with supplementary springs, and, without any data at hand as to the characteristics of the semi-elliptics not so equipped, it is impossible to state whether, in any of the latter cases, the vibration problem was solved by the design of the main springs themselves, making recourse to supplementary springs unnecessary.

Study of action of the several spring combinations at varying loads and speeds and over road surfaces of different characters should disclose to what extent vibration can be eliminated by such devices and whether any probable advantage would be gained in the reduction of maintenance of chassis parts by incor-

porating refined and developed devices of this character in the original design of commercial models. The subject is of interest now, when the tendency seems to be toward increasing the speed of commercial vehicles for long-haul service.

It is not improbable that pneumatic tire performance might be improved if the heavier shocks caused by road surface imperfections were absorbed by springs designed and proportioned for that specific purpose.

It is only necessary to recall to mind the modified wagon springs used on motor trucks only a few years ago and compare them with the more scientifically designed and manufactured motor vehicle springs of to-day with their increased resiliency and permanence to appreciate the possibility of further improvement to meet the newer conditions of truck service.



Enclosed spirals at the front and rear ends of the Nacke

Jordan Idea of Organization

EDWARD S. JORDAN, president of the Jordan Motor Car Co., has completed an organization of the men and women who have been in his employ for one year or more. It is known as the Loyal Order of the Red Arrow. Its object is to recognize and foster loyal service.

"Our whole organization is founded on the Jordan ideal," said Jordan. "Our Loyal Order of the Red Arrow is composed of men and women who are learning together the great joy and satisfaction of doing things well. The emblem is a small solid gold pin bearing the Jordan red arrow.

"We who are working together have learned the secret of success. It is to try to do each thing that we do to-day a little better than we did it yesterday. Every person reaches a point in his career when he must choose one of two courses. If he chooses to be clever, he will meet with great competition. If he chooses to be honest, he will meet with conspicuous success.

"Wearers of our emblem include every man and woman who has served in the factory organization or in any distributor's or dealer's organization for a year or more, and every owner who has driven a Jordan car for that same period.

"In joining the Loyal Order of the Red Arrow we take this pledge:

"The men and women of the Jordan organization, having learned by happy experience the great joy and profit that lies in doing things well, and being fully conscious that good quality and good character are beyond all competition, do pledge ourselves to strive for success by putting into the product of our hands and brains the best that is in us—knowing, as we do, that only in this way may we hope to command that respect for our efforts and that tolerance for our shortcomings which the world accords to the man who has the courage to live and think with profound regard for his own good name."

Tractors Are Seriously Tested in Ohio

There has recently been a widespread demand for the testing of tractors in field demonstrations. The most extensive demonstrations of this kind were held this month in four cities in Ohio, and the figures published were compiled by observers from the Ohio State University, Agricultural Engineering Department.

ASERIES of four tractor demonstrations has just been concluded under the auspices of the Ohio State University, Agricultural Engineering Department, which has added materially to our knowledge of the capabilities of different tractor models. The four demonstrations followed one another at short intervals, and all of the tractors and implements were transported on a special train of 15 flat cars and two box cars from one demonstration point to the next.

Since the events were well advertised, and it was known to the farmers that the performance of individual tractors would be closely observed and the result published, it is no wonder that a very satisfactory attendance was recorded. To interest the farmers in the event the University Extension Department conducted a regular publicity campaign, issuing an announcement about a month in advance and then following this up with other matter drawing attention to the demonstrations.

As a further means of spreading the news of the demonstrations, banners were hung on the train that carried the tractors and farm implements from place to place, announcing the points and dates of the next demonstration. A similar banner was also carried by a motor truck used by the management for carrying some of the lighter equipment from place to place.

The four demonstrations were held at Columbus, Middletown, Fostoria and Akron, and the attendance at these different points is estimated to have been 4000, 6000, 10,000 and 7000 respectively.

A total of 28 tractors took part in the demonstrations, which consisted of plowing the ground and fitting it for a seed bed. After the ground was plowed the tractors went over it again, this time pulling disk harrows to which cultipackers were hitched on behind.

Dynamometer tests were made during the demonstrations by means of a Gulley dynamometer, from the graphical records of which the university staff calculated the average and the maximum drawbar horsepower. This dynamometer, like other similar instruments, consists of

two units, a measuring unit and a recording unit, the former being inserted between the tractor and the implement hitch. Records are also made of the distance traveled and the time elapsed, so that the horsepower developed by the tractor on the drawbar can be calculated.

Two series of tests were made, one designed to subject the tractor to a normal load, and the other to work it to its maximum capacity. In the first test the plows were set to a reasonable depth, while in the last they were set to plow at about the maximum depth possible with any particular tractor, at the regular plowing speed.

The chief specifications of all tractors and the calculated results obtained with each one were compiled in a table which accompanies this article. It was, of course, impossible to have the plowing conditions uniform for all the tractors, and a note regarding the footing encountered by each tractor is incorporated in the table. Observers followed the tractors to check up the depth of plowing, and it is believed that the results obtained are as trustworthy as any ever given out in connection with tractor demonstrations or contests.

A great variety of plowing conditions were encountered in the demonstrations. While at Columbus, where a 150-acre wheat stubble field was plowed in two days, the ground was fairly level, at Middletown, where it was sandy, grades of 8 per cent were encountered; and at Akron the grades even ran up to 10 per cent. At Akron and Middletown the soil was of a sandy nature, while at Fostoria it was black and sticky.

At each demonstration the plowing was followed by a conditioning operation, in which each tractor hauled a cultipacker behind a disk cultivator, the gangs of disks of which were set at a considerable angle. The work done at all points was favorably commented upon by the farmers, and especially the fact that in the demonstration at Middletown, where a 26-acre field covered with high weeds was turned over, practically no weed tops showed above ground when the operation was completed.

Aberdeen Demonstration Strengthens Wichita Argument

(*Staff Correspondence*)

ABERDEEN, S. D., Aug. 21.

ADDITIONAL and conclusive proof was presented here this week that a national tractor demonstration no longer attracts the farmer. The Northwest Tractor Demonstration, closing here to-day, drew a smaller crowd than that which attended some of the local Ohio demonstrations held during the last few weeks.

On the first day here there were only a few hundred real farmers present. A liberal estimate on the crowd yesterday would be 5000. No more were present to-day.

This result is a keen disappointment to Aberdeen, which had prepared for and expected at least 25,000 visitors. This shows, without a doubt, that national tractor demonstrations are dead as far as drawing a crowd is concerned.

Following the Wichita show, this was the expressed sentiment of a majority of the tractor manufacturers represented there. The Aberdeen demonstration has stiffened that sentiment into conviction. They must give way to something else.

The showing that will supplant them in appeal to public

Ohio Tractor Demonstration Tests

Conducted by Department of Agricultural Engineering, Ohio State University, 1919

OFFICIAL RESULTS OF

MAXIMUM TEST										
NORMAL TEST										
Tractor	MOTOR			Position of Wheels	Weight	Plow-ing Speed	Plows	Previous Crop	Foot-ing	
	Cyl.	Size	R.P.M.							
1. Cletace.	12-20	4	34x51 ^{1/2}	1250	3150	316	2-14"	Wheat	Good	
2. J. T.	16-30	4	5x61 ^{1/2}	1000	6900	212	3-14"	Wheat	Good	
3. Avery.	12-25	4	61/2x61 ^{1/2}	570	7500	123	3-14"	Wheat	Good	
4. Case.	12-27	4	41/2x60	1250	5600	123	3-14"	Wheat	Good	
5. Moline Universal.	9-18	4	34x51 ^{1/2}	1600	3380	312	2-14"	Wheat	Good	
6. Fordinson.	10-20	4	4x55	1000	2700	212	2-14"	Wheat	Good	
7. LaCrosse.	12-24	2	6x57	750	4200	212	3-14"	Wheat	Good	
8. Case.	12-24	2	6x57	750	4000	212	3-14"	Wheat	Good	
9. Illinois.	10-15	4	34x51 ^{1/2}	750	3600	212	4-14"	Wheat	Good	
10. Illinois.	18-30	4	5x61 ^{1/2}	800	5200	212	4-14"	Wheat	Good	
11. Wellington.	10-20	4	5x61 ^{1/2}	1000	4750	3	2-14"	Wheat	Good	
12. Huber.	12-25	4	41/2x55 ^{1/2}	1000	5000	212	3-14"	Wheat	Fair	
13. Parrett.	12-25	4	41/2x55 ^{1/2}	1000	5200	212	3-14"	Clover	Fair	
14. Reliable.	10-20	2	6x57	500	3800	212	2-14"	Wheat	Poor	
15. Waterloo Boy.	12-25	4	41/2x55 ^{1/2}	750	5000	212	3-14"	Clover	Poor	
16. Willis.	15-25	4	41/2x55 ^{1/2}	850	3250	312	3-14"	Wheat	Poor	
17. Titan.	10-20	4	6x58	500	5525	212	3-14"	Wheat	Poor	
18. International.	8-16	4	4x55	1000	3300	212	2-14"	Wheat	Poor	
19. Ault-Taylor.	11-30	4	41/2x61 ^{1/2}	800	1000	212	4-14"	Wheat	Poor	
20. Monarch.	18-30	4	4x55	7400	7300	212	3-14"	Wheat	Fair	
21. E.B.	12-20	4	41/2x55 ^{1/2}	900	4355	212	3-14"	Wheat	Poor	
22. Shelby.	9-18	4	39x55 ^{1/2}	1100	4000	312	2-14"	Wheat	Poor	
23. Hart-Part.	30	2	61/2x77	750	6000	212	3-14"	Wheat	Poor	
24. Heider.	12-20	4	41/2x63 ^{1/2}	750	4000	212	2-14"	Wheat	Poor	
25. Heider.	9-16	4	41/2x63 ^{1/2}	800	5000	212	3-14"	Wheat	Poor	
26. Bates Steel Mule.	15-22	4	4x56	900	3500	212	3-14"	Wheat	Crawler	
27. Frick.	15-28	4	41/2x66	900	6000	212	3-14"	Wheat	Poor	
28. Whitney.	9-18	2	51/2x61 ^{1/2}	750	3000	212	2-14"	Wheat	Poor	
29. Whitney.	9-18	2	51/2x61 ^{1/2}	750	3000	212	3-14"	Timothy	Excellent	
30. Fric.	15-28	4	41/2x61 ^{1/2}	900	3500	212	3-14"	Timothy	Excellent	
31. Bates Steel Mule.	15-22	4	4x56	900	3800	212	2-14"	Timothy	Excellent	
32. Shelly.	9-18	4	39x55 ^{1/2}	1100	6000	212	3-14"	Timothy	Fair	
33. Heider.	12-20	4	41/2x63 ^{1/2}	750	4000	212	3-14"	Timothy	Excellent	
34. Hart-Part.	20	2	61/2x77	750	6100	3	3-14"	Timothy	Fair	
35. E.B.	12-20	4	41/2x63 ^{1/2}	900	4355	212	3-14"	Timothy	Excellent	
36. Monarch.	18-30	4	43x66	800	7400	212	3-14"	Timothy	Good	
37. Ault-Taylor.	15-30	4	41/2x63 ^{1/2}	800	4000	212	4-14"	Timothy	Excellent	
38. International.	8-16	4	4x55	1000	5000	212	2-14"	Wheat	Good	
39. Heider.	10-20	4	41/2x66	900	3250	212	3-14"	Wheat	Good	
40. Walls.	15-25	4	41/2x65 ^{1/2}	850	5000	212	3-14"	Wheat	Good	
41. Waterloo Boy.	10-20	2	6x57	750	5800	212	3-14"	Wheat	Good	
42. Reliable.	10-20	2	6x57	750	3800	212	2-14"	Wheat	Good	
43. Parrett.	12-25	4	41/2x55 ^{1/2}	1000	5200	212	3-14"	Timothy	Good	
44. Huber.	10-20	4	41/2x55 ^{1/2}	1000	5000	212	3-14"	Timothy	Poor	
45. Wellington.	12-24	2	6x57	750	4750	212	3-14"	Timothy	Poor	
46. Illinois.	18-36	4	5x61 ^{1/2}	1030	5200	212	4-14"	Wheat	Poor	
47. Case.	12-24	2	6x57	750	4000	212	3-14"	Wheat	Fair	
48. La Crosse.	12-24	2	6x57	750	4200	212	3-14"	Wheat	Fair	
49. La Crosse.	10-20	4	4x55	1000	4000	212	3-14"	Wheat	Poor	
50. Fordinson.	12-24	2	4x55	1600	3380	312	2-14"	Wheat	Poor	
51. Moline Universal.	9-18	4	15x27	41/2x55 ^{1/2}	1600	5600	212	3-14"	Timothy	Fair
52. Case.	12-25	2	61/2x67	570	7500	123	3-14"	Timothy	Fair	
53. Avery.	12-25	2	61/2x67	570	4000	212	3-14"	Timothy	Poor	
54. Avery.	13-16	4	4x56	800	4000	212	3-14"	Timothy	Fair	
55. J. T.	16-30	4	4x56	1000	6900	212	3-14"	Timothy	Fair	
56. Cletace.	12-20	4	34x51 ^{1/2}	1250	3150	312	2-14"	Wheat	Fair	

interest will be the State or local demonstration. It is admitted that some form of demonstration must continue. Most of the manufacturers believe there is and that there will continue to be a demand for demonstrations, but that future demand will be strictly local in nature. Even those manufacturers who have been most insistent upon the perpetuation of the national events have come to this way of thinking, and express themselves as reconciled at last to the inevitable.

Would Hold Demonstrations in Every State

Perhaps J. B. Bartholomew, president of the Avery Co., comes as nearly expressing the opinion of those manufacturers favoring demonstrations as any one can when he says:

"There will be future tractor demonstrations because there is a demand for them. As long as there is a demand for such shows I am for holding them. I would myself be in favor of putting on a tractor demonstration in every State of the Union, so that each section might see what the tractor can do. These could take the place of the big shows such as we have been giving."

The general opinion of the tractor men, freely expressed, is something like that, with individual modifications. Most of them favor tractor demonstrations of a local character put on by distributors and dealers with the assistance of the manufacturers. Also a larger proportion of them than used to be the case are willing to confess that a mere plowing demonstration, such as those held at Wichita and here, get nowhere, and they are verging toward the idea that demonstrations must be so conducted that they actually will determine something about the relative capacity of the various machines.

They see, because they are not blind, that a mere plowing and fitting demonstration means nothing to the farmer and does not further the interests of the manufacturer. Some of the manufacturers have been in the business long enough to have gained confidence in their own machines, and they express a willingness to submit them to fair tests to determine their quality. On the other hand, there are some who yet are recalcitrant in this respect.

However, such legislation as has been enacted in Nebraska and North Dakota during the last year is convincing the manufacturers that unless they want to see similar legislation in many States they must modify their objections to a fair test, and must participate in demonstrations that really will mean something.

Performance Satisfactory

Weather conditions at Aberdeen were ideal, and the dust was normal. The soil was dry, and in some places hard, but it was friable, and pulverized easily. Generally speaking, the work done by the tractors was entirely satisfactory. There was little difficulty experienced either with tractors or plows.

The plowing plots were considerably larger than at Wichita, and the machines were in the fields longer. But otherwise the demonstration was the same as that held at Wichita.

The first 81 machines, of 32 makes, participated. Of these, 58 pulled mouldboard plows of some kind, while one pulled a disk plow. The other 22 were hitched to seeders, binders, straw spreaders, water tanks, and the like. The demonstration given by the fitting implements was very satisfactory.

Naturally, the region in which the demonstration was held determined to a considerable extent the type of the tractors demonstrated, as it did also the kind and size of the plows pulled. There was a larger proportion than usual of tractors with a capacity of more than four bot-

toms. Also more engine plows were pulled than were ever before exhibited at a similar event. There were a considerable number of tandem outfits, consisting of two and three-bottom plows. Some concerns making a line of tractors had one of every size in the field, each pulling its appropriate number of bottoms.

The one disk plow, put into the demonstration by the Emerson-Brantingham Implement Co., was something of a novelty to many of the farmers present because the disk plow has never been used to any great extent in this part of the country.

About 1700 acres of land were plowed. This was the fact which perhaps made the deepest impression upon the minds of the visitors. Comment was frequent that the efficiency of the tractor to take care of the peak load on the farm was more clearly demonstrated by the amount of work done within the time limits of the demonstration than by any other one fact.

The display at the tents was characteristic, but it was not as large as it was at Wichita this summer, or at Salina last year. There were, however, some displays distinctive in so far as they exhibited implements especially adapted to this section. There were a number of live exhibits of belt power applications in the way of grain separators, silo fillers and feed grinders. All such machines were running idle, however, hence the test in this department was not quantitative.

Accessory Show Limited

The accessory show was limited. Except for a few concerns always seen at such events, the accessory tents housed principally a display of the local automotive interests. The exhibits ran overwhelmingly to motor cars, motor trucks and farm lighting plants. The number of the two last was indicative of the degree of interest the Dakotas are manifesting in these things.

The crowd was almost exclusively local. The same excuse was offered here as at Wichita, that the farmers were too busy with their threshing and other fall work to take time off for a tractor show.

Aberdeen business men are entitled to credit for the way in which the show was handled. Every one was taken care of comfortably, and in no single instance was there an attempt made at extortion. On the contrary, visitors were favored at the expense of the home people, and actually paid less for their accommodations. The city was tastefully decorated, and all manner of entertainment was provided for the crowds.

The demonstrations included the following tractors: Titan, International, Turner, Liberty, Heider, Bates, Waterloo Boy, Russell, E-B, Moline, Cletrac, Townsend, Wallis, LaCrosse, Hart-Parr, Monarch, Eagle, Huber, Fordson, Plowman, Holt, Case, Parrett, Aultman-Taylor, Gray, Oil Pull, Flour City, Twin City, Avery, Stinson, Illinois, Dakota, Farm Horse, Allwork, and Tu-Ro.

A number of concerns which were entered, and which expected to be present, were prevented by the non-arrival of their machines. Notable among these latter were the Lauson and the Frick.

Rubber Step Plates

STEP plates molded of rubber are manufactured by the Tyler Mfg. Co., Boston, Mass., in several styles. They are claimed to afford a sure footing in entering and leaving a car, and to serve the purpose of a door mat, as they can be easily kept clean by brushing or washing. One type is made with a separate center in which the car manufacturer's name can be molded if desired.

Continuous Movement in the Essex Production Line

Often a halting production movement is explained by the excuse that the buildings are not fitted to the installation of a desirable system. This might be an excuse for the Essex plant, if an excuse was wanted. But instead of an excuse, there is a production system. It has been adapted to existing conditions and the fact that it does the work is a suggestion to others.

By J. Edward Schipper

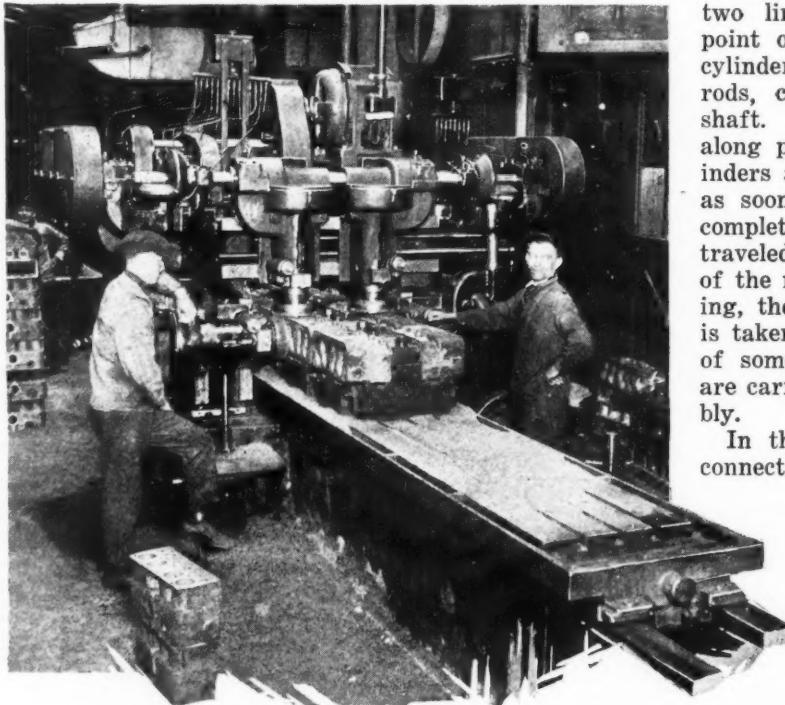
In manufacturing the Essex car at the plant of the Hudson Motor Car Co., the engine, chassis and body are treated as separate units until they are delivered complete at the final assembly line. The work is carried out on all three of these units in a strictly progressive manner, and in the case of the body and chassis, the sub-assembly work is done on moving chains. The engine is handled in manufacture by gravity or roller conveyors from operation to operation, and in assembly by an overhead rack and rail arrangement in which the engines are pushed from station to station by hand after completing the operations at each particular point.

This division of the work makes the production layout of the Essex car divisible into four parts: Engine manufacture and assembly; chassis assembly; body assembly, and final assembly. Each of these is unified and independent.

The machine shop for manufacturing the engine, the assembly racks and the final tests are all in one large oblong building, the layout of which is illustrated in the large diagram on the next page, which shows the direction in which the parts travel and how the layout is arranged.

Layout of Engine Manufacture

A study of the diagram shows that engine manufacture and assembly have been arranged in a long building approximately 400 by 120 ft. The parts travel lengthwise with a typical machine shop layout for progressive manufacture in each sub-department. Cylinder manufacture, which is the time-determining feature, proceeds along one side of the building straight from the raw material to the terminal point at the assembly rack. This is close to the wall on one side of the building. Along the opposite wall, crankshaft manufacture pro-



Principal machine operation on Essex car which acts as the time criterion for the entire job—milling the cylinder blocks

ceeds, and between these two lines at the starting point of the plant are the cylinder heads, connecting rods, crankcases and cam-shaft. These all proceed along parallel with the cylinders and crankshafts, and as soon as they have been completed, if the line has not traveled the entire distance of the manufacturing building, the balance of the line is taken up by manufacture of some small parts which are carried on to the assembly.

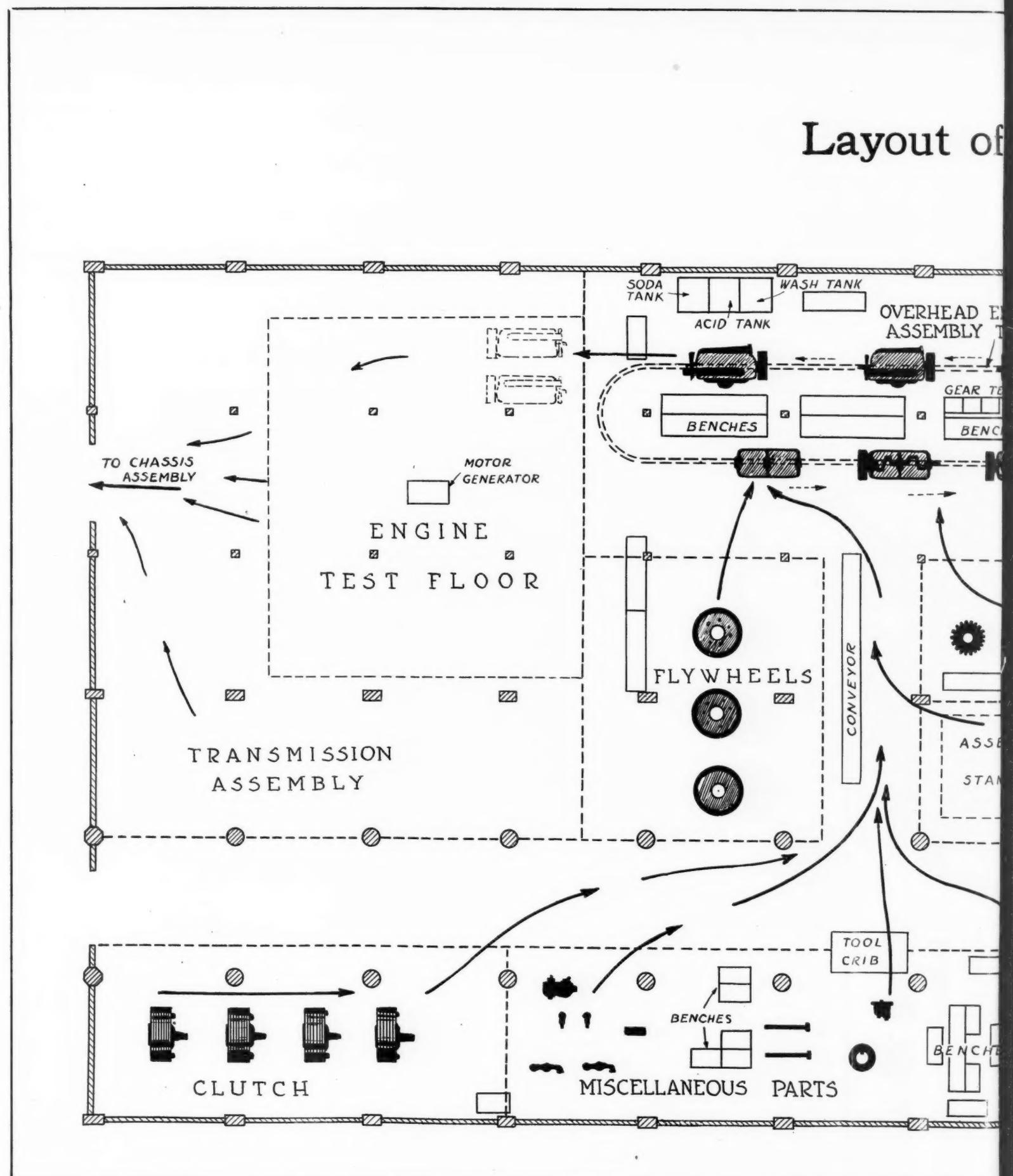
In the same line as the connecting rods and just beyond them are the pistons and timing gears, and beyond the camshaft and crankshaft line the miscellaneous small parts and the clutch are manufactured. Throughout this entire manufacturing building, therefore, parts

are flowing continuously in parallel streams, with operation after operation taking place in sequence, so that each move in the direction of the end of the line means that further steps have been made in manufacture. The number of machines used on each operation and their spacing along the line depend on the length of time required for each operation. The machinery is, of course, so purchased and grouped that there will be a sufficient number of machines on each job to complete the desired number of operations on the desired number of pieces in the proper length of time to meet the schedule of production.

Destination, Assembly Rack

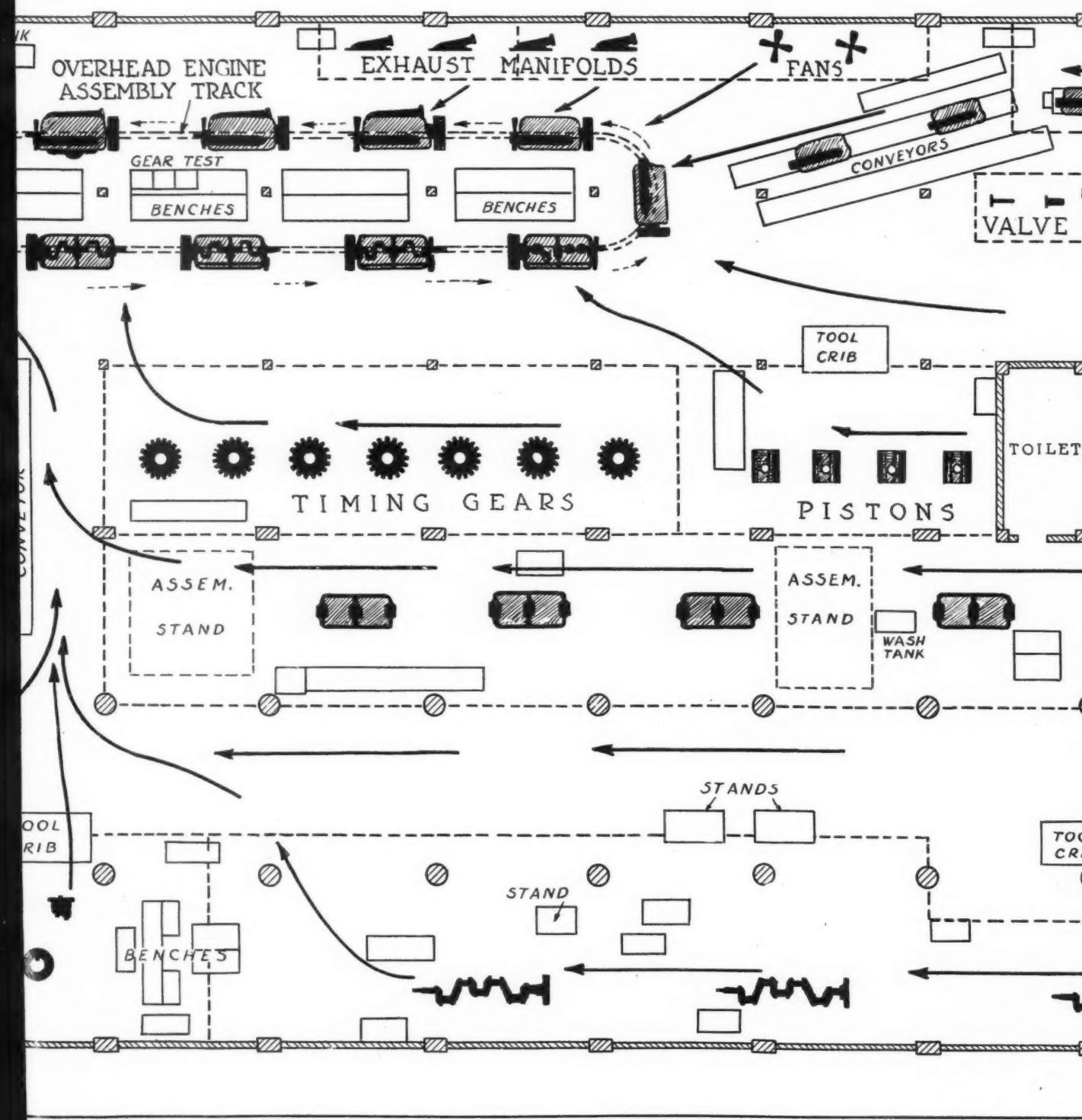
The engine assembly rack is the destination of all parts, and this is an overhead carrier frame device, elliptical in shape and capable of holding 38 engine assembly frames. On the way to the elliptical assembly rack and between different operations the gravity conveyors are used. For instance, gravity conveyors are close to the crankcase,

Layout of



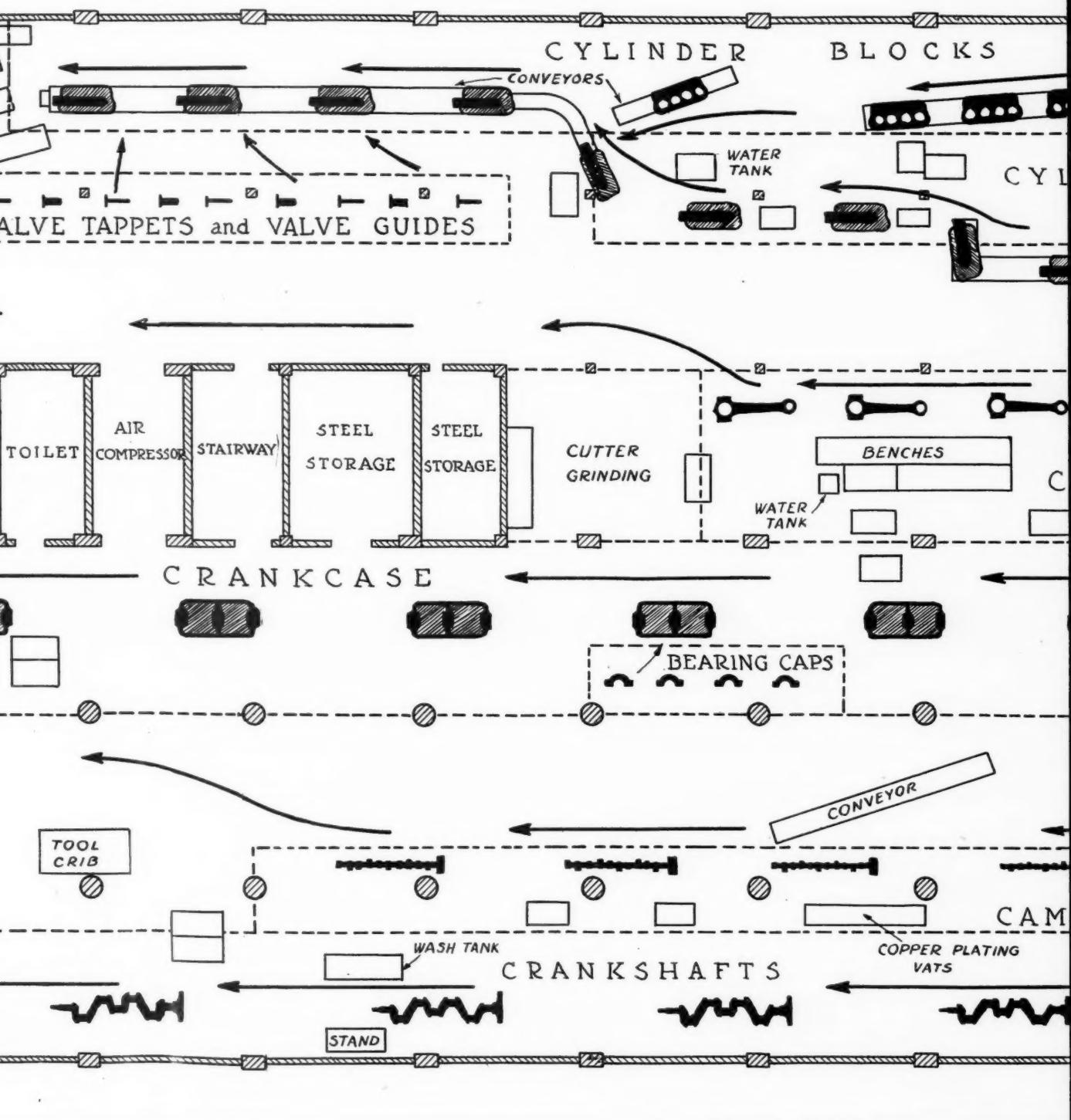
Layout of Machineshop, Assembly and Test

Showing Progression of Parts from Raw Materials

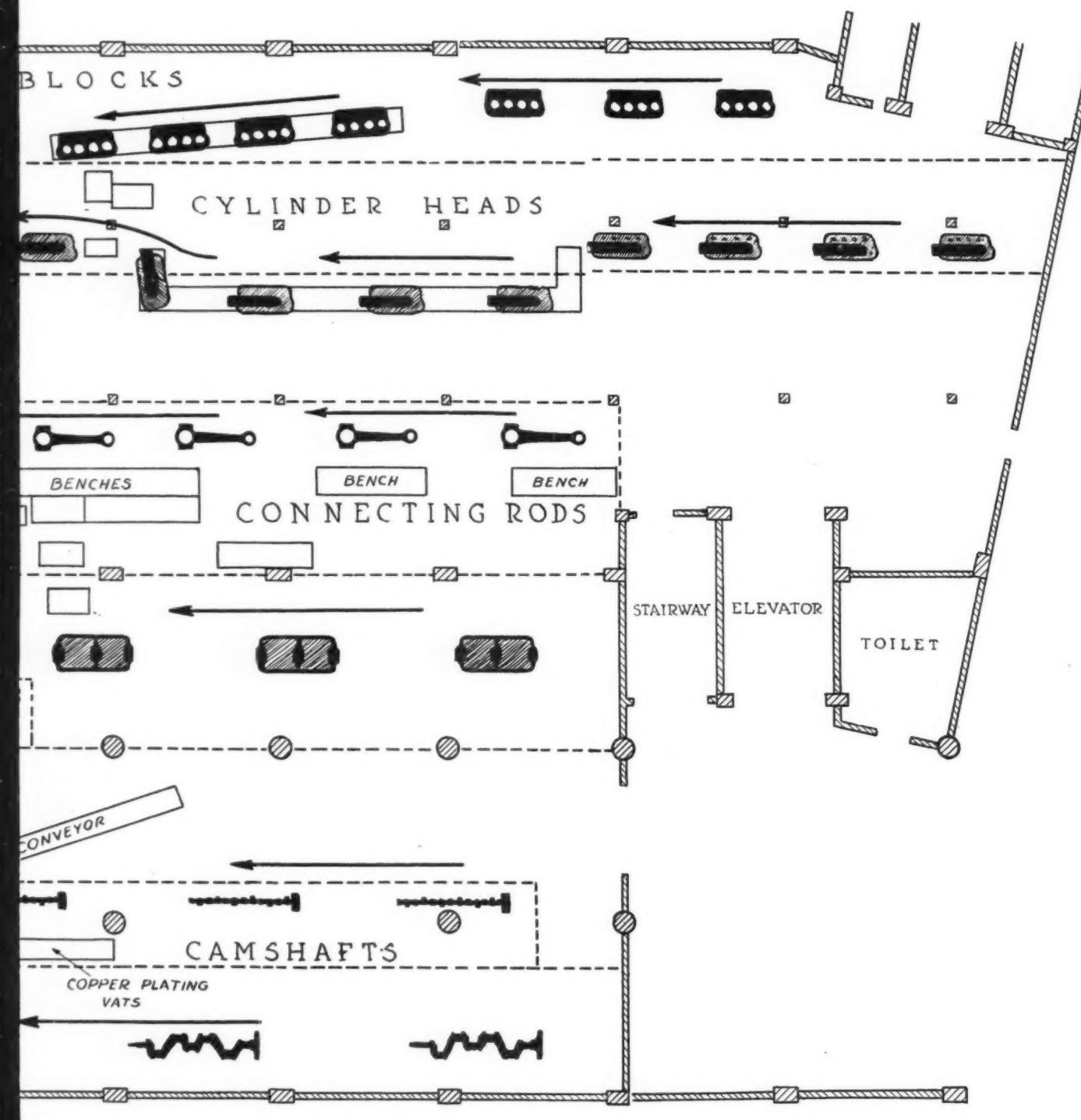


Test Floor for Essex Engine Manufacture

Raw Material to Finished Engines



nufacture



cylinder head and cylinder block lines, to conduct the parts from one machine to the next. Magazine feed gravity conveyors are used for small parts to which they are adapted, such as pistons. Other small parts such as valves, camshafts, etc., are handled in suitable racks on wheels which are pushed from one department to another as required.

With this explanation in mind the entire story of engine manufacture can be obtained from the diagram herewith. The moving chain type of conveyor is not used in Essex engine assembly or manufacture, because with this it would be necessary to take the job off the moving chain and put it back again in order to perform several operations. There are certain adjustments which have to be made on an engine which require trial and testing.

For instance, on one particular chain line, where engines are assembled in this manner, it is necessary, even with the best possible organization of the work, to break away from the usual progressive method. As an example, on the adjustment of the main and connecting rod bearings it is necessary that the same man walk along the

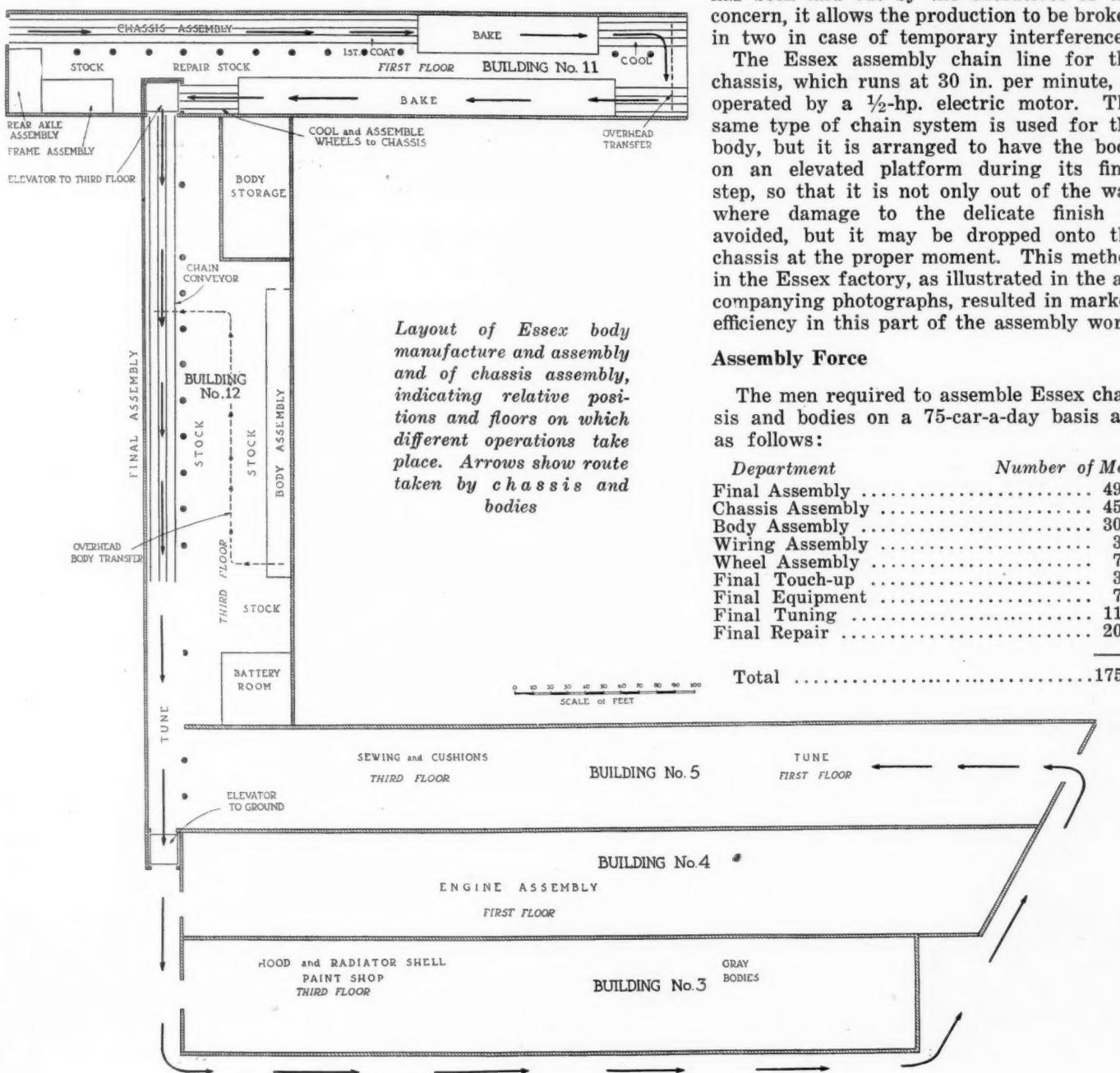
chain a considerable distance while he completes the adjustment and shimming of the bearing. This is required because when a man makes an adjustment and tests it, he alone knows what he has done to secure that particular fit, and if the job is turned over to the next man in an incomplete manner, he has to start the experimentation all over again, so that it is bad for two or more men to do this work.

Chassis and Body Assembly

The Essex plant is a 150-car-per-day plant. There are two lines of chassis and body assembly, each capable of seventy-five per day. This arrangement has been adopted because it allows the production to be elastically handled, makes it possible to vary between 75 and 150 a day without destroying the efficiency of the plant, and, furthermore, with the two production lines the physical layout of the plant is thus accommodated. The number 75 has not been chosen because there is any economic value in this particular number, but simply because it suits the length of the plant, and since the 150-per-day schedule has been laid out by the executives of the concern, it allows the production to be broken in two in case of temporary interferences.

The Essex assembly chain line for the chassis, which runs at 30 in. per minute, is operated by a $\frac{1}{2}$ -hp. electric motor. The same type of chain system is used for the body, but it is arranged to have the body on an elevated platform during its final step, so that it is not only out of the way where damage to the delicate finish is avoided, but it may be dropped onto the chassis at the proper moment. This method in the Essex factory, as illustrated in the accompanying photographs, resulted in marked efficiency in this part of the assembly work.

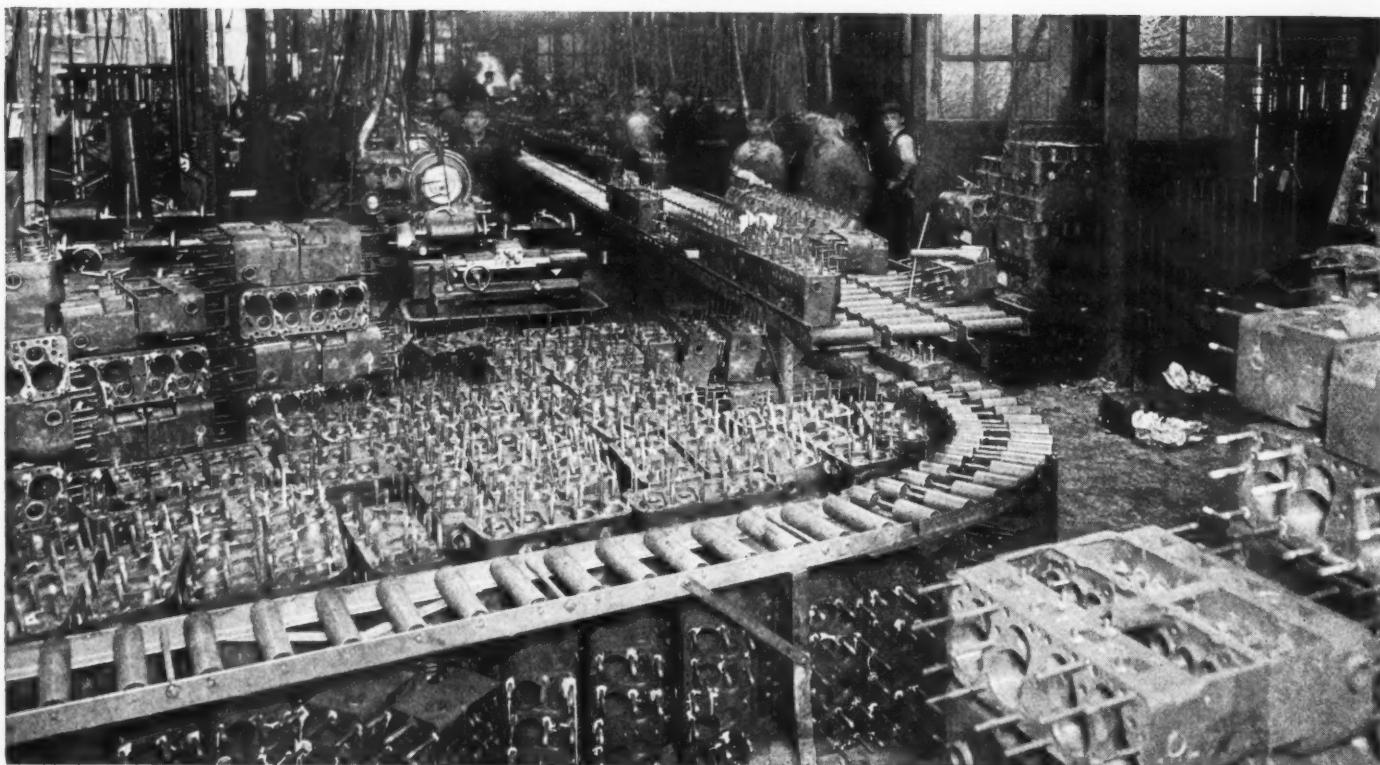
Layout of Essex body manufacture and assembly and of chassis assembly, indicating relative positions and floors on which different operations take place. Arrows show route taken by chassis and bodies



Assembly Force

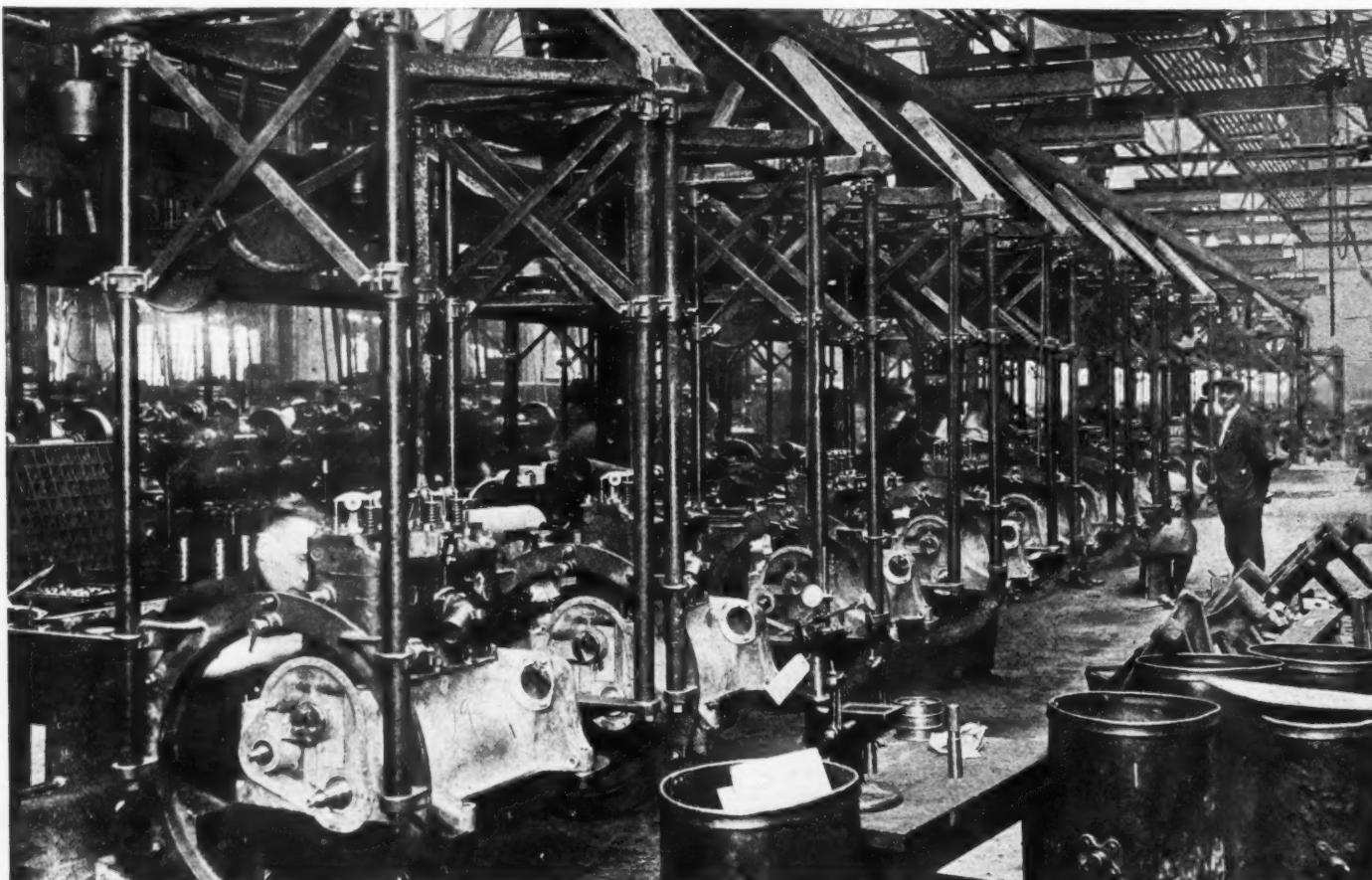
The men required to assemble Essex chassis and bodies on a 75-car-a-day basis are as follows:

Department	Number of Men
Final Assembly	49
Chassis Assembly	45
Body Assembly	30
Wiring Assembly	3
Wheel Assembly	7
Final Touch-up	3
Final Equipment	7
Final Tuning	11
Final Repair	20
Total	175

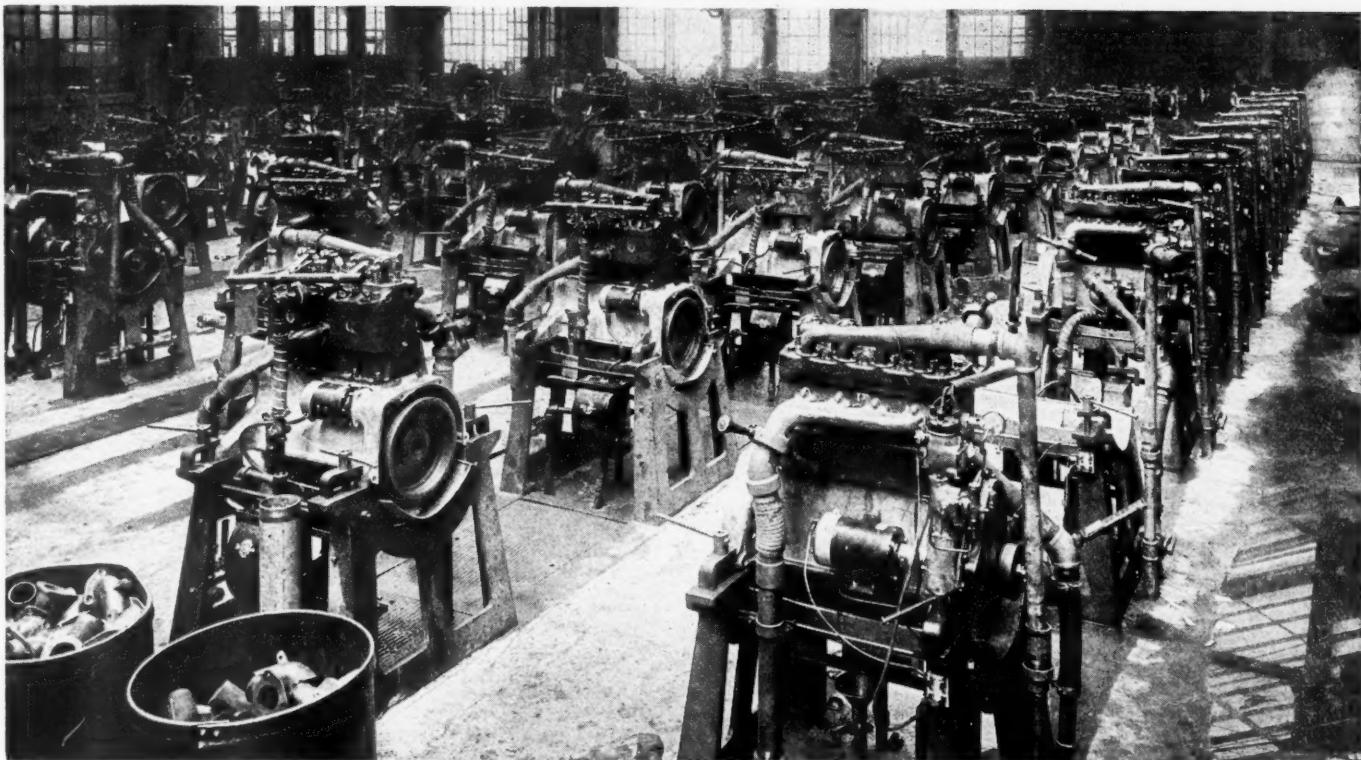


Gravity conveyor system for transporting blocks from machine to machine. A system of this kind should be used on all parts weighing over 40 lb.

As stated, the chain runs from 30 to 33 in. per minute, preceding department. No shorter gap is permitted. and there is approximately three feet between succeeding chassis. A wider gap indicates delay in operation in a The diagram showing the body and chassis assembly illustrates very clearly the way the work proceeds on



Overhead carrier system for engine assembly as used in the Essex plant. This is mounted on an elliptic overhead track and is capable of carrying thirty-eight assembly frames



Engine test room arranged for 150 engines per day. There are 98 test blocks here. Note that engines are started by means of their own electric starters and deliver current to circuit supplied by balancing 6-volt generator

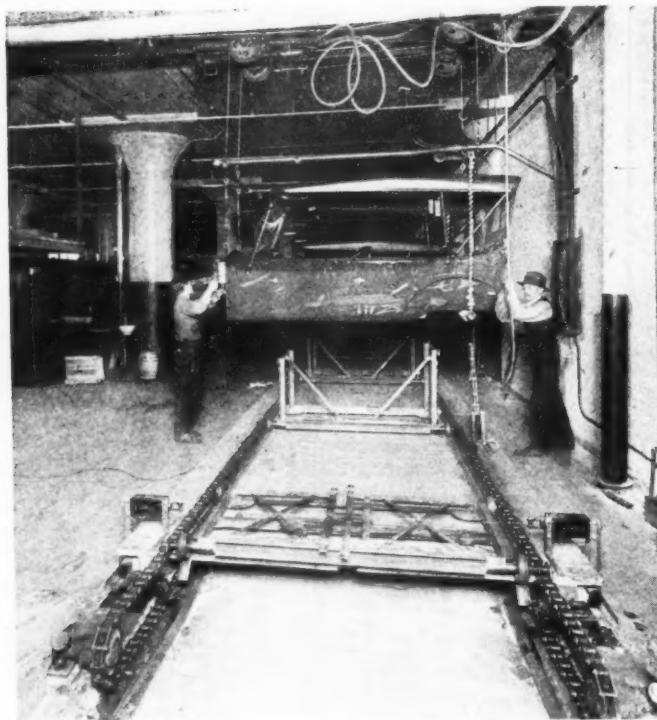
the first and third floors, until it finally reaches the end of the final assembly, where the tuning department is located.

Chassis assembly takes place on the first floor. As

indicated by the plan, it starts at the northwest corner of the group of buildings and proceeds along the north wall, east, until it reaches the first bake oven, where the first coat is dried. There is then a short space be-



Essex chassis moving along parallel assembly chain lines, moving at 33 in. per min.



Collapsible rack dispenses with tunnel for chain conveyor system for bodies

tween the bake ovens and the overhead transfer, the purpose of which is to allow the chassis to cool.

After the chassis has become cool it is lifted onto an overhead transfer and carried over to the opposite side of the room, starting back in a westerly direction, passing through the second bake oven, until finally it reaches a hoist at the end of the line, after assembly is complete.

This hoist takes the assembled chassis up to the third floor at the beginning of the final assembly line. Thus there is no transportation of the assembled chassis beyond lifting it directly up to the final assembly line on the third floor. As indicated clearly by the diagram, final assembly and body assembly run parallel with each other, the body assembly being complete at a point on the final assembly line where the chassis has been made ready to receive the finished body.

Body Assembly

The body assembly is on the third floor. The upholstery work is also done on this floor, and the row of bodies are moved over to a body storage department. From the body storage, indicated on the diagram, the bodies enter the body assembly line and are made ready to be mounted on the chassis. The body chain moves along parallel with the final assembly line, as described, and when the end of the line is reached, the bodies are picked up by an overhead body transfer mechanism and carried out of the way of the shop, across to the final assembly line, where they are dropped.

The final part of the body assembly work, after the body has received its paint, is done on an elevated platform, so that nobody is in contact with these bodies except men who have work to do upon them. This greatly reduces the risk of damage to the completed bodies and permits them to arrive at their destination with a minimum of dents or scratches. For those bodies which are dented or scratched through accident, there is a little side department which has to do with the repair of such accidents, and the bodies come back on to the regular production line after they have been fixed up.

There is a small stock space at the point where the body assembly line joins the final assembly line, so that in case body assembly is proceeding at a slightly higher rate than final assembly, which it should do normally, the little stockroom takes care of the over supply.

Timing of the entire final assembly, of course, is governed right from the start of the final assembly line, where the completed chassis begins its passage along the chain. Final assembly proceeds in the usual way along the line, the bodies being dropped on at the proper points, and finally, when the complete job leaves the end of the final assembly chain, the tuning department is entered and tuning as far as possible is done on the third floor. After this the car is lowered to ground level by an elevator at the end of the tuning department along the final assembly line, and is driven around the building under its own power, to the tuning and repair departments.

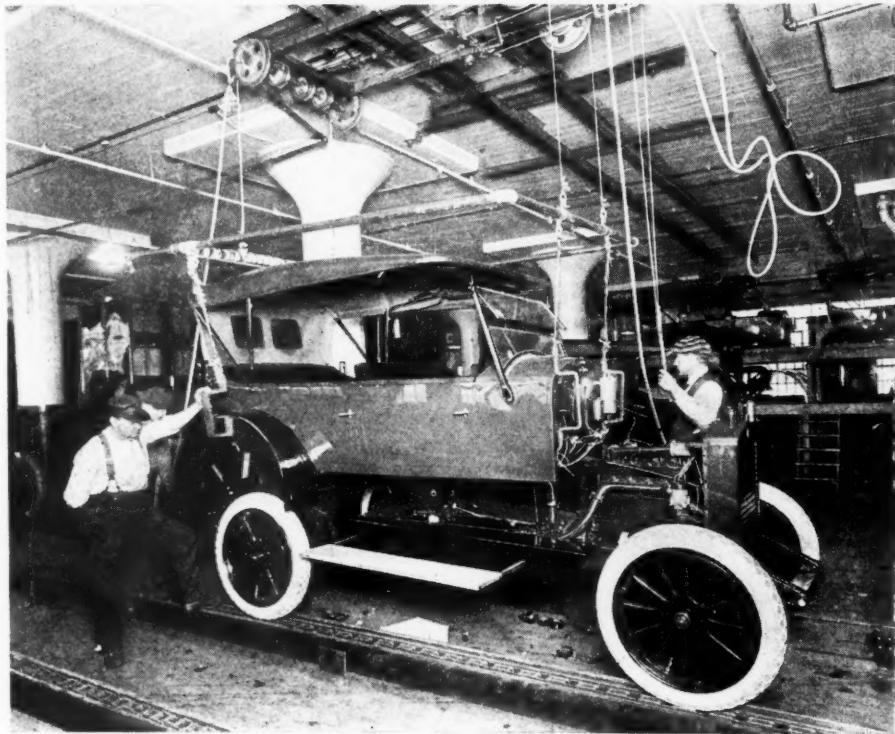
The part of a building shown in the diagram of the body and chassis assembly which is not used for the Essex is utilized for the Hudson, so that by this new routing two cars are really manufactured in a plant formerly occupied by one. Space has been economized in a great many ways. For instance, where the bodies go up through an elevated platform the space beneath serves for storage. This economy of space is carried very far in every department, with the result that this is probably the most intensively laid out plant in this field.

Studying the manufacture and assembly from this space-saving standpoint, the illustrations herewith show how the floor space is utilized so that practically every square foot has some duty to perform and there is but little or none which can be truly said not to bear its part in the general scheme of manufacture. If the view showing the gravity conveyor in the engine cylinder department is referred to, the way in which the completed cylinder blocks are stacked up beneath and on both sides of the roller conveyor gives an idea of the highly concentrated manufacture in this building.

The racks for the engine assembly are also compact and are very close together, end to end. Room is left for the workmen, and at his hand are stored the parts he will need in accomplishing the operation with which he is entrusted, but beyond this there is no room for him to wander around in, and the end space is not required be-



Body assembly line on gravity conveyor, arranged so that workman on fenders operates at convenient height



Body lowered from elevated platform to chassis at proper point on assembly line

tween the engines in these operations of final assembly, so that the engines can be pushed closely together on the racks upon which the assembly work is done.

As the Hudson buildings are comparatively long and narrow, the Essex chassis and bodies are sent along the chain endwise. In this way two tracks take the transverse space which would otherwise be occupied by but one track. An aisle space about 4 ft. wide is provided between the two lines of track, and the track is clear of the window space and of the pillar row, so that men can work on both sides of the chassis at all times.

When the bodies are lowered on the chassis from the overhead conveyors shown in the illustration, they are complete. The top is on, and one of the features of manufacture is that the top is fitted on the car and not simply on the bows. The body is dropped on to the chassis with the vacuum tank and all the rods, etc., which are mounted on the dash, in position. The body is dropped perpendicularly to the correct point on the chassis, being held by a square frame made up of pipe joints in such a way that both ends are lowered simultaneously from the overhead conveyor.

In installing a chain system in a factory not originally designed for it, it is not always necessary to dig a tunnel for the return carriers. The Essex body assembly is carried out on a chain conveyor which was laid on a floor not originally designed to carry it. In order to bring the carriers back to their original position, a collapsible design was made, as illustrated. At the end of the line the carrier frames are laid flat and allowed to run back beneath the chain under a board platform. The usual thing with chain systems is a return tunnel underneath the floor.

Another point in body assembly which is of value is that in allowing the body to be carried on a platform above floor level it affords an opportunity of handling the fender assembly in such a way that the workman is at the best possible height and is able to conduct the operations on the fenders at eye level.

For testing, the rear wheels are put on rotating drums

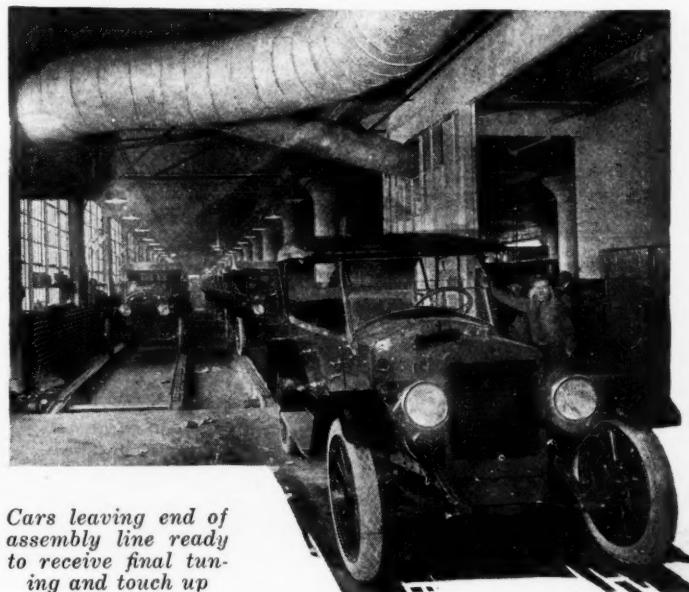
which absorb the power, and the cars are run with their own engine on these drums. This affords engine, clutch, transmission and rear axle tests, giving practically the result of a road test without the disadvantages of the latter.

German Technical Library Planned

THE German Union of Technical Societies has recently presented to the National Assembly and to various university libraries, etc., a petition appealing for the provision of a Central Technical Library which will be of real use to German technical men. At present there exists no library of the kind where the technical public may borrow a book to take away and read. The existing technical college libraries are too restricted, and permission to borrow from other libraries is difficult to obtain. The suggestion is that the proposed library should be run entirely for the benefit of the technical world, readers being able to have books sent to them at a distance. Furthermore, a proper reference department should be run in conjunction with the library, and if possible an in-

formation bureau and a photostat establishment where copies of important official documents, patents, etc., could be prepared at cost price. A sufficient number of copies of each publication, periodical, etc., should be provided for the needs of subscribers. As the cost of such an institution would be many million marks, it is suggested that the German Patent-office Library should be reorganized and made the nucleus of the new establishment. This library already contains a million specifications and 200,000 volumes, all on technical subjects.

ACCORDING to a telegram from Omsk from the Minister of Commerce in Admiral Koltchak's Government, the improvement in platinum mining will result in a considerable increase in the output of this metal. The platinum obtained in the Urals amounts to about 95 per cent of the quantity obtained in the whole world.



Cars leaving end of assembly line ready to receive final tuning and touch up

Studies in High Speed Aerodynamic Phenomena

This interesting article on the air tunnel investigations at McCook Field is prepared by two men who have been active in that work and opens the way for further development of the airplane. The comment on the workings of the wind tunnel is instructive.

By F. W. Caldwell and E. N. Fales *

DURING the past six months new advance in the study of aerodynamical phenomena has been made possible by the completion of the Army high speed wind tunnel at McCook Field, Dayton, Ohio. The wind tunnel is noteworthy as having a speed of air flow in the throat of 500 m.p.h.; a speed made possible by carefully designed air passages and fan.

The speed and size of a wind tunnel are of recognized importance in the interpretation of all results obtained. The usual coefficients of aeronautical engineering are determined by tests on a model aerofoil of 3 to 6 in. chord at velocities of 45 to 100 f.p.s. The data obtained must be applied in the full scale to areas a hundredfold greater in the case of wings, and to velocities ten times greater in the case of propellers. There may be a discrepancy between model and full scale coefficients.

While scaling rules and empirical factors worked out in practice have enabled us to produce very fair results, there is decided room for improvement. Indeed, so meagre is the available information on the scaling effect, as treated under the "Law of Dynamic Similarity," that a growing tendency has been observed among aeronautical engineers to regard the classical coefficients K_x and K_y as inadequate.

It has been almost universally the practice to write:

$$L = \frac{\rho}{g} K_y A V^2$$

$$D = \rho/g K_x A V^2$$

Where L is the lift, D the drag, A the area of the sup-

*Mr. Caldwell is aeronautical engineer and Mr. Fales aeronautical mechanical engineer, at McCook Field. They retain the copyright privileges for this article.

porting surface, V the velocity of advance, ρ the density of the air in weight units and g the acceleration due to gravity (hence ρ/g is the density of the air in slugs).

It is well known as the result of experience that the values of K_x and K_y vary somewhat with velocity and also with the size of the surface under consideration. If l represents one of the linear dimensions of the surface, it is assumed, according to the law of dynamic similarity, that values of K_x and K_y are functions of the product Vl .

The Army wind tunnel permits the attainment of a Vl ratio of 60 (V in ft. per sec.; l in feet). While this figure is twenty times less than the corresponding full size wing values, it is only four to eight times less than full size propeller values. The studies afforded have greater significance than if the same ratio were obtained with a larger model and smaller velocities. Two discoveries of outstanding importance have been made in this tunnel, and will be referred to below under the headings "Visualization of Flight Vortices by the Dewpoint Method" and "Effect of Velocity on Unit Forces of an Aerofoil."

McCook Field 14-inch Wind Tunnel

As in other wind tunnels, air is sucked through a horizontal tube, where it blows against a small model at known velocity. The model is supported by a rod projecting from a suitable balance into the tunnel; and the forces concerned in flight can thus be measured. The air after passing the model is decelerated in an expanding cone and exhausted into the room by a propeller-fan. Description of the McCook Field tunnel need include only those features which differ from the standard type.

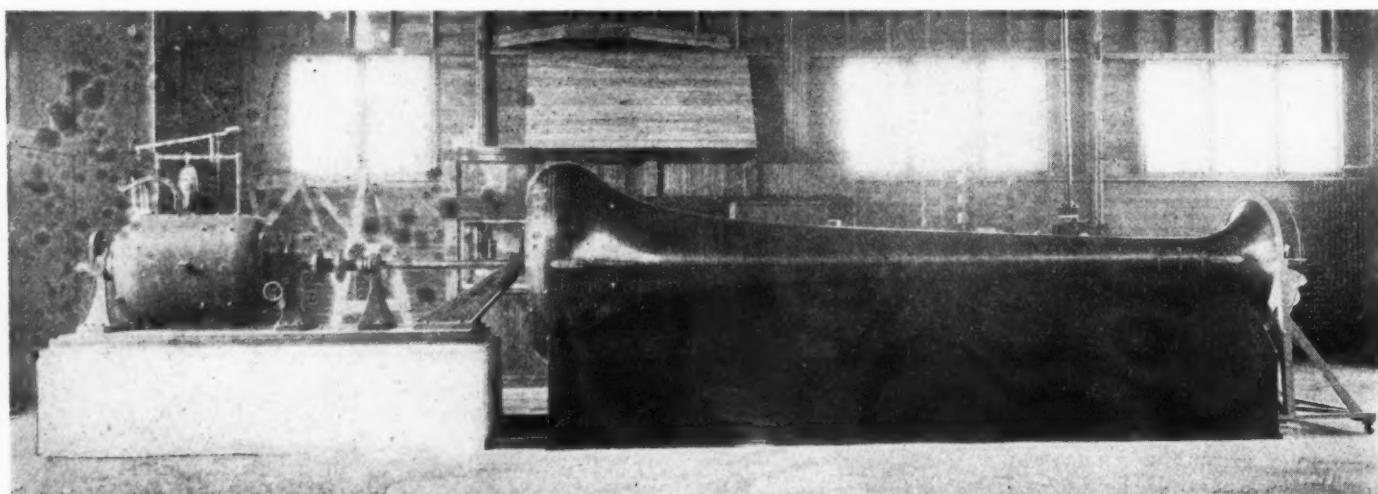


Fig. 1—General view of wind tunnel

The intake trumpet, tube and expanding cone have the general form of a venturi tube with a length of 18 2/3 ft., an intake trumpet diameter of 3 1/2 ft., a radius of curvature of 22 3/4 in., a throat diameter of 14 in. and a fan diameter of 5 ft. The venturi characteristics are the design of C. P. Grimes. Their merits are manifest through the fact that there is no appreciable loss of energy at the intake, and that the traverse of a diameter at the commencement of the throat shows no appreciable velocity variation except at the walls. The usual honeycomb is omitted, but a four-bladed "straightener," 48 in. long, is inserted in the cone 4 ft. downstream from the model. This "straightener" cuts down the fluctuations of velocity from 15 to 2 per cent. The cone is of 5 deg. angle for the first 100 in.

The power plant consists of a Sprague dynamometer, capable of delivering 200 hp. for one-half hour at 250 volts and 1770 r.p.m. without overheating. The 5-ft. fan is made with a solid center disc 40 in. in diameter, and has 24 blades 10 in. long. At the upstream side of the 40-in. disc, a bell of equal diameter is fixed in the tunnel so that the air is led up to the annular discharge opening with a minimum of eddies. The operating efficiency of the whole tunnel is 76 per cent, which is higher than has been usual in determining aerofoil coefficients in other wind tunnels.

Noise and Fan Speed

Careful study of fan and cone design results not only in reduced losses but also in reduced noise. In the past the noise has been a serious objection to speeds greater than 70 m.p.h. in wind tunnels. It may be said that 60 per cent of the roar of any airplane is due to the propeller. For wind tunnel use the combination of fan and cone adopted has brought about a considerable improvement, as indicated in the following tabulation:

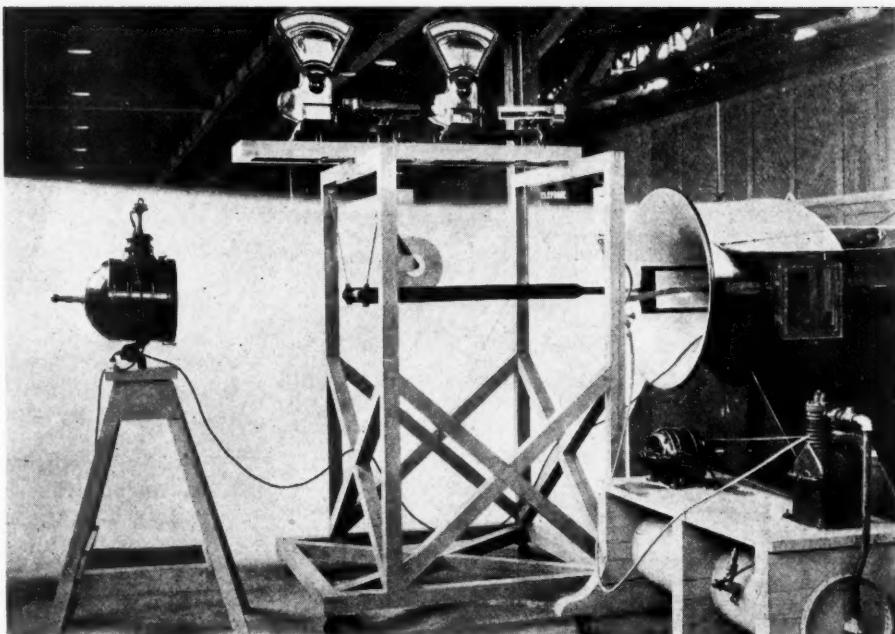


Fig. 2—Wind tunnel balance, intake and throat

From the operator's position—

The fan is noiseless at.....	50 m.p.h.
The fan starts to roar at	60 m.p.h.
Conversation is easy at	125 m.p.h.
Conversation is slightly forced at	155 m.p.h.
Conversation is possible 12 in. apart at	240 m.p.h.
Conversation is possible 4 in. apart at	300 m.p.h.

The balances are of two types. The first one, designed by C. P. Grimes, measures lift and drift on two separate instantaneous reading Toledo scales. It is mounted upon a portable carriage. The spindle for the model projects horizontally from this carriage axially into the mouth of the wind tunnel, carrying the model at its free end. The spindle terminates in a thin, flat bar, the latter clamping a graduated disk which is rigid with the model at the center of the span. This type of balance possesses three advantages, as follows: (1) Instantaneous readings make it possible to synchronize balance and velocity observa-

tions and to practically eliminate the effect of velocity fluctuations; (2) The air forces can be qualitatively studied, as, for instance, in the case where a given set-up has two values of K_y , when the balance can be seen to change from one reading to another; (3) The method of support affords a highly accurate means of skin friction observation.

The second type of balance is of the "vector" type, invented by the Wright brothers, with improvements developed by the writers; the principle is indicated on the sketch (Fig. 4). It is seen that this balance reads L/D with an accuracy superior to the ordinary type, and that it reads lift and drift in terms of static pressure. The advantage of the latter feature is that the reading is dead-beat.

In addition to support of model at the center of its span, a method of supporting at both ends is proposed. Interference due to supporting spindle becomes serious at high speeds; the

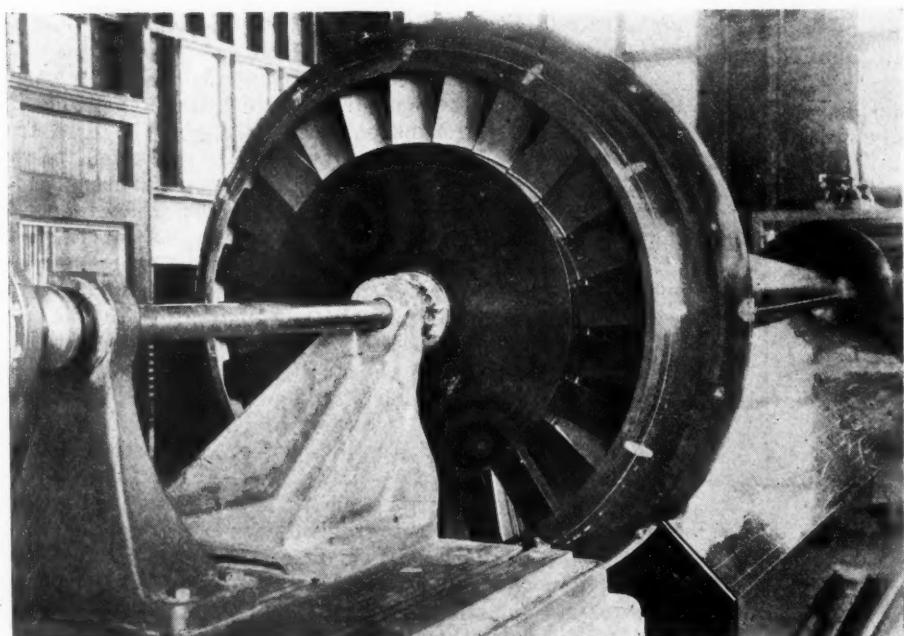


Fig. 3—Fan end of wind tunnel

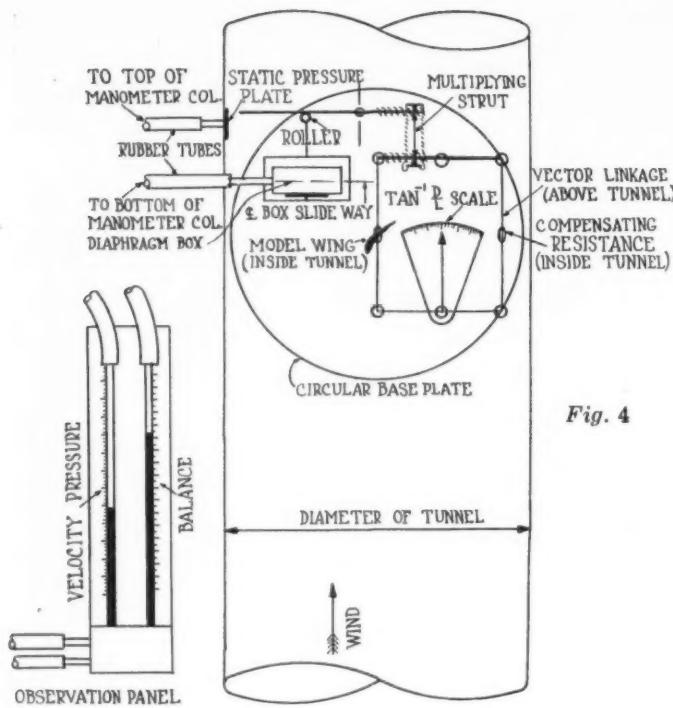


Fig. 4



Fig. 6—Air flow through the tunnel without obstructions

one-end spindle used at the National Physical Laboratory cannot be utilized, although its correction coefficient is now fairly definite. Therefore, a method is being developed wherein the peculiar characteristics of the McCook Field tunnel afford virtual elimination from the tests of errors due to spindle interference.

Visualization of Flight Vortices by "Dewpoint Method"

The "Dewpoint Method" of visualizing air flow, discovered by the writers together with C. P. Grimes, offers a solution to one of the fundamental problems of aerodynamics. This problem is the quantitative empirical measurement of the phenomena of fluid dynamics appertaining to flight and airflow.

The accepted theory upon which flight has its physical basis is purely rational. It has not yet been directly applicable to engineering design, because empirical measurement of flight vortices has never been made. Therefore, the aeronautical engineer's use of aerodynamics is largely according to the cut and try method. He cannot, on the drafting board, depart from known shapes, speeds or sizes; should he wish to do so, he must first build a model and determine the coefficients applicable to his new design.

To illustrate this point, it is only necessary to refer to the simplest case, that of an airplane wing. We can meas-

ure the coefficient of force on a small model of this wing to an accuracy of 1 per cent. But we do not know definitely how the accuracy is changed by scaling up to full size, or to full speed. We cannot, without tests, predict the change of coefficient to be expected when the wing shape is altered, or the angle of attack, or the position with reference to other surfaces.

Aerodynamical theory will serve practical use when supported by empirical data. In the past, flight vortices have never been measured, nor even visualized to a usable extent. Analysis of air flow has been confined to the use of smoke or powder set loose in the air to indicate lines of flow; or of threads used as wind-vanes. Or we have been driven to analogies derived from the study of fluids of differing viscosity and density, such as water. Or, further, we have sought by measurement of static pressures in the air surrounding a body to deduce the lines of flow. But these methods have given small encouragement toward the practical application of the vortex theory to engineering use.

The "dewpoint method" bids fair to supply the missing link between aerodynamical theory and design. It depends upon the fact that the moisture in the air condenses out as fog when the temperature is reduced to the dewpoint, provided there is a solid or liquid nucleus to start the condensation. In the McCook Field wind tunnel the temperature drop is brought about through adiabatic expansion of the air during acceleration due to 100 in. of water suction. Relative humidity of the atmosphere can be artificially raised if too low. The necessary nucleus for condensation is provided by the model itself.

The temperature of the air passing through the throat is calculated on the assumption that the expansion is adiabatic from the atmospheric pressure to the pressure corresponding to the "dewpoint," and is polytropic below the latter pressure. A correct knowledge of throat temperature is, of course, essential; and it is necessary to develop a special method of thermometry for reading it. Present methods are inapplicable to its direct measurement, for a thermometer introduced into the air stream occasions more or less adiabatic compression of the air striking it, with consequent rise of temperature at the point of impact. (See chart, Fig. 5.) The most advantageous position for the thermometer is with the bulb downstream, where it is subject chiefly to skin friction rather than impact. Further investigations are being made of the matter.

Flight vortices become readily visible by the "dewpoint method," and can be photographed with the aid of a searchlight. Fig. 7 is an enlargement of a moving picture film looking downstream. It is inferior to visual observation, the vortices showing as above the model, due to parallax. To the naked eye they are in line with the wing tips, and are clean-cut, perfect circles. They extend downstream a

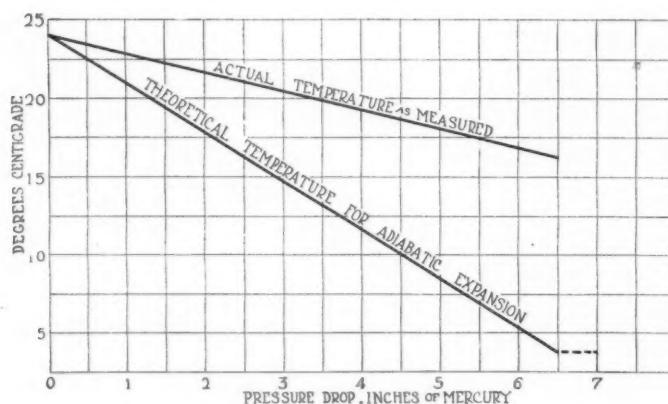


Fig. 5



Fig. 7A—Diagrammatic representation of the direction of air flow when viewed from upstream



Fig. 1D—View of air around the model
(Note the tip vortices above the model at each end. This view was taken from upstream.)

distance of several dozen chord lengths from the rear corner of each wing tip, enlarging in diameter as the distance increases. The shape, size and direction can be noted, but the periodic run is so quick as to require stroboscopic analysis. For corroboration of the phenomenon at slow speeds, smoke lines are useful. A special apparatus for the purpose has been developed by R. T. Goodwin. The observed vortices differ for different aerofoil set-ups.

Visualization of Unobstructed Air Flow

When the model is removed the vortices and eddies of flow through the unobstructed throat may be observed. Fig. 6 is an enlargement of a moving picture film looking down stream into the open mouth of the tunnel, the exposure being illuminated by a searchlight behind the camera. The condensation is more pronounced behind the impact tube and thermometer bulb than elsewhere, since these are obstacles to the flow and therefore constitute nuclei for condensation. A projecting cotter pin 1/16 in. high at the wall causes a perfect vortex, not visible in the cut, which shows up against the white foggy background as a black circle.

The general appearance of the air flow, which may be considered typical of all air flow, is as follows: A cross-section at the throat shows a seething mass of fog spectres, denser at the walls than at the center, though occasionally the entire disc fills up with fog to the point of opacity. The spectres have, in the cross-sectional plane, a gentle movement like the flame of an alcohol stove, showing the constant readjustment of equilibrium. Vortices and "S" shaped whirls continually form, and, after moving about, lose themselves in the general confusion. In a diagonal view they take the appearance of long, foggy fibres, stretching down the tunnel like wooden moldings. The axes of whirl are, of course, parallel to the tunnel axis. Under proper humidity and lighting conditions the whole becomes a beautiful iridescent sight, violet and purple hues predominating.

For further analysis of the phenomenon a glass section is to be constructed to replace the present wooden throat.

Effect of Velocity on Unit Forces of an Aerofoil

An extensive series of experiments has been started on propeller aerofoils in order to determine the effect of speed on the lift and drag coefficients. It may be said that in

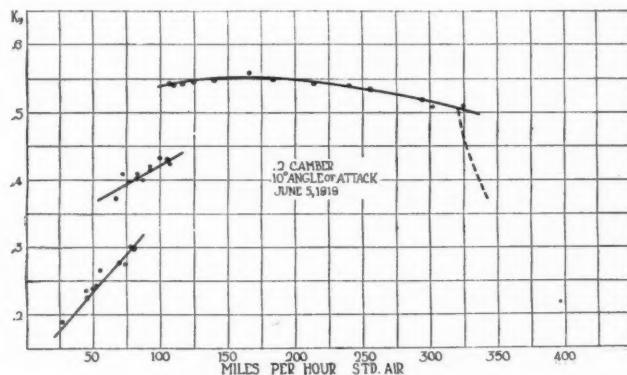


Fig. 9

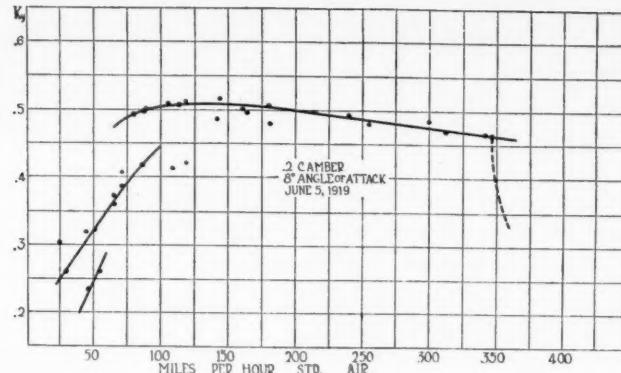


Fig. 8

such experiments the assumption is made that moisture condensation does not affect the density of the air striking the model, condensation occurring only after the model is passed.

Reference to the charts showing the lift coefficients plotted as a function of velocity will show that the lift coefficient increases very rapidly at small velocities. There are apparently two distinct types of flow at these low velocities, as the lift coefficients follow two distinct lines. The third intermediate line undoubtedly represents different types of flow on the two sides of the aerofoil. This is possible because of the center support which divides the aerofoil into two parts.

It is found that where discontinuity occurs an increase of lift always is accompanied by a decrease of drag, and vice versa. That is, the high value of the lift coefficient always corresponds to the low value of drag and the low value of lift always corresponds to high value of drag.

The most novel and significant thing in connection with these measurements is the discovery of the second critical speed or limiting velocity at which the lift again suddenly decreases and the drag suddenly increases. (See Figs. 8, 9 and 10.) This critical velocity was found for all angles down to about 3 deg. for the section of 2 in 10 camber ratio. The critical velocities and angles are shown for the whole series in Fig. 11.

Fig. 12 shows the lift coefficient for a section having a camber ratio of 1 in 10. It is to be noted that this relatively thin propeller section when set at this angle does not show any change in lift coefficient. No doubt, if the velocity were sufficiently increased a critical velocity would be found.

The discovery of the critical speed of these aerofoils has an interesting bearing on the possibilities of high speed propellers.

We have found by practical experience that if we do not go below a value of V/ND of 0.65, we get a very fair propeller efficiency. As we have gradually increased the speed of our planes we have gone on increasing the r.p.m. of the

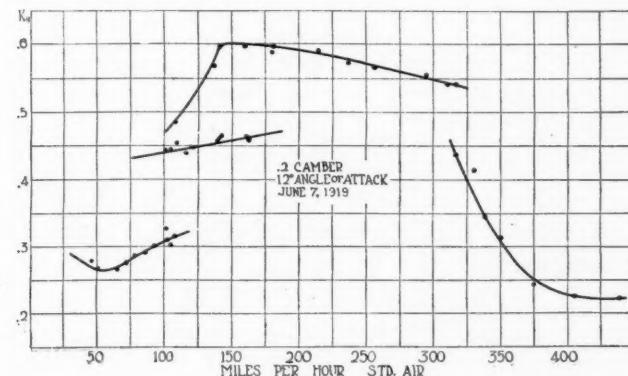


Fig. 10

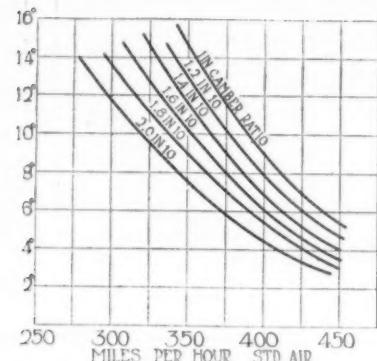


Fig. 11

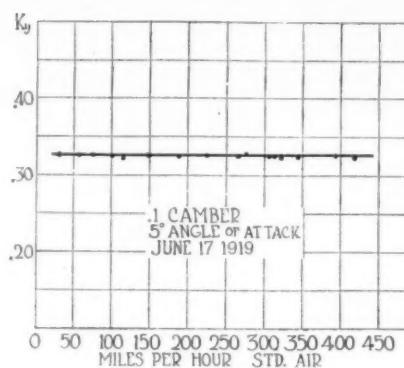


Fig. 12

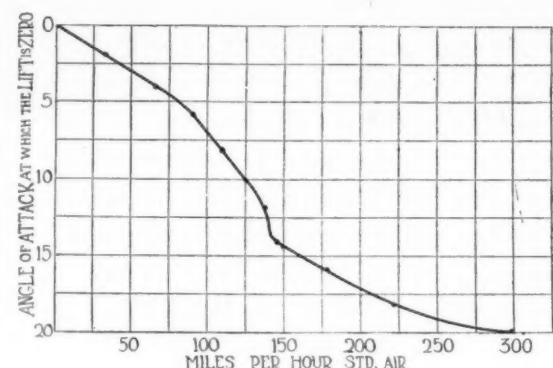


Fig. 13

engine and the diameter of our planes so that the value of V/ND has remained about the same for the great majority of propellers in actual service.

We have always assumed that there was no limit to this development aside from the characteristics of the plane and engine. That is, we have made the assumption that we could double our propeller speed just as soon as we were able to double our plane speed and strengthen our engine enough to stand the stresses involved.

It now appears, however, as though there is a limit to propeller speed aside from the value of V/ND or, to use more familiar terms, aside from pitch ratio.

Unfortunately, even the speed obtainable in the McCook Field wind tunnel is not great enough to measure the limiting velocity for relatively thin sections when set at low angles. Consequently we are only able to infer that it exists from extrapolation of the curve of critical speeds. (See Fig. 11.)

The charts attached throw light on several important

questions of aerodynamics. Figs. 8, 9 and 10 apply to a 0.2 camber aerofoil at 8, 10 and 12 deg. angle of incidence. They show the change of lift coefficient at different velocities. They also show the position of the first and second critical angles.

Fig. 11 applies to a series of six aerofoils whose upper surface camber varies from 1 in 10 to 2 in 10; it shows the shift of the second critical angle.

Fig. 13 applies to a 0.2 camber aerofoil and shows the shift of the angle of zero lift at different velocities.

The fact that the angle of zero lift shifts with the velocity has not heretofore been demonstrated, and is not well known among engineers.

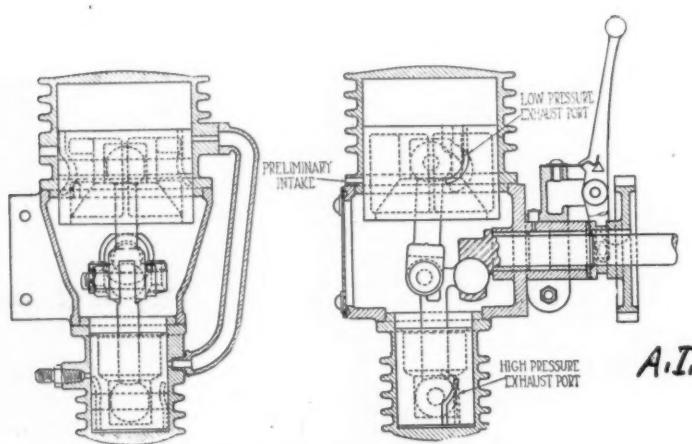
It is to be noted that a thick section which, at slow speed and negative angle, shows negative lift, may at high speed exert a positive lift at an angle as low as minus 20 deg. During an increase of velocity the angular position of the resultant force vector changes from the quadrant of negative lift to the quadrant of positive lift.

A Two-Stage Power-Driven Tire Pump

A TWO-STAGE power-driven tire pump of rather novel design is being marketed by the Rex Machine Co., Chicago. Two sectional views of the machine, as well as a photograph, are shown herewith. The two cylinders are located opposite each other, and the two pistons are operated from a single crank. A peculiar arrangement of the working parts makes it possible for the piston to serve also the functions of a suction and delivery valve, the piston having both an oscillating and a reciprocating motion. The low-pressure cylinder has a bore of 3 1/4 in., the high pressure 1 7/8 in., and the stroke of both pistons is 1 5/32 in. At a speed of 1000 r.p.m., the pump is capable of delivering 6 cu. ft. of air per minute, and pressures up to 200 lb. per sq. in. can be obtained. All moving parts are heat treated

and ground. A sliding gear and gear shifting lever are combined with the pump, so that the latter can be disengaged when not required.

We have been furnished with the following results of a recent test made on this pump by the H. H. Franklin Mfg. Co.: The average time to pump up a 32 x 4 in. tire to 50 lb. per square inch was 119.8 sec. The average horsepower required when working against a pressure of 50 lb. per square inch was 0.54. The average temperature rise when working against 50 lb. pressure in an endurance run was 144 deg. Fahr. On the endurance test no grease was pumped through into the tank. No grease was added during the test.



Two sections through pump

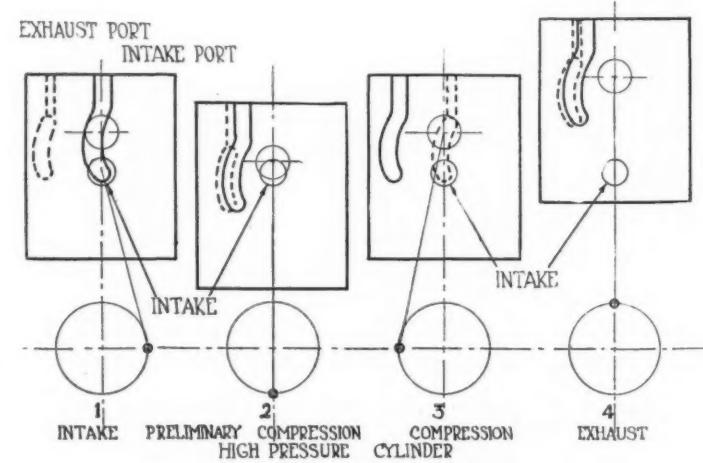


Diagram of valve action

Six Months' Trade with Latin America Larger Than Year Ago

Prosperity in a majority of South American Republics overcomes losses in Chile and Peru and total shows a gain of \$2,015,700 over the corresponding period of 1918. Outlook is for greater increases with regular sailings to South American ports and greater production in this country

THE sales of American passenger cars and trucks to the Latin-American Republics during the first six months of 1919 show a very satisfactory increase when compared with those of the corresponding period in 1918.

We have made a net gain of \$2,015,700 despite heavy losses in Chile and Peru, and it is evident that the measure of our future success depends solely on our capacity for production and shipment.

The increase is largely due to the prosperity in Argentina and Brazil and there is every indication of continued trade on a mutually satisfactory basis. Both Republics are developing rapidly; they have reaped a financial harvest during the past five years and their credit is excellent. In Argentina, gold shipments have restored the American dollar to par or thereabouts, and the number of vessels flying the United States flag which have entered the port of Buenos Aires during the past few months has increased appreciably. The subject of road making is receiving more attention than formerly in both Republics, and, in consequence, they will shortly afford improved prospects to the truck manufacturer.

Mexico Offers Big Field

Mexico continues to be a good customer, sufficiently so to indicate the possibilities of trade expansion as soon as her internal conditions improve. The Mexican Department of Agriculture is taking deep interest in the development of the extensive valley lands which are suitable for cultivation by farm tractors, and seemingly the tractor field will soon be ready for active cultivation. In this connection an official traveling exhibition of agricultural machinery has been arranged in the hope that it will stimulate interest in mechanical aids to successful farming.

Cuba's passenger car purchases dropped during the period under consideration, but as her truck purchases increased it is very evident that shortage of cars rather than lack of transport caused the falling off. The car and truck trade in Cuba is in a flourishing condition and there is ample scope for increased trade.

A decrease of \$731,516 in our Chilian trade is serious, but explainable. During the early portion of 1918 we were dispatching all available shipping to Chile, as we were in urgent need of nitrates. These vessels were available for carrying domestic products on their outward journeys; consequently our automotive trade was well maintained. Our need for nitrate had ceased in 1919, our shipping facilities to Chile diminished accordingly—and our trade suffered.

Peru has also fallen off in her purchases. Unsettled local conditions have undoubtedly had their effect, the

shipping problem loomed up here also and our diminished production also accentuated the difficulty.

Factory production is, of course, as much of a factor in this trade as in the domestic trade. Reports received directly from the Latin American countries indicate that the dealers there have not fared any better than dealers in this country, and perhaps not as well. Early in the year, delivery was an important factor.

Shipping Facilities Improve

With relief in sight as to both production in the factories in this country and with more regular sailings, there should be a more satisfactory trade condition. Factories are steadily coming near to the demand in the apportionment of the production, and shipping masters are more willing to accept the freight offered. The Chilian situation is certain to improve if the movement by that government to establish a line of 16-knot, 6000-ton vessels to sail under regular schedule between Valparaiso and New York materializes.

Sales are relatively small in certain of the minor Republics. In this connection it is necessary to remember that the area of a country or its population has but little bearing on its capacity to absorb cars or trucks. Perhaps the main factor for consideration is the percentage of native population; a section which is, as a whole, unable to do more than afford the bare necessities of life. For example, Paraguay has not purchased a single car or truck during the past year.

Extracting the totals from the table herewith we get the following:

Exported to Latin American Republics		
	Cars	Trucks
January-June, 1919.....	7,000	1,197
1918.....	6,837	732

A satisfactory feature is the increase in our truck business with Latin-American Republics. We are gaining ground in spite of the heavy handicap placed on mechanically propelled commercial vehicles by the absence of good roads and the extremely low cost of horses and labor. We have also had to contend with an apparent lack of appreciation on the part of the majority of producers, who seemingly do not fully realize the many advantages to be gained by the substitution of trucks for horse-drawn vehicles, irrespective of any consideration of first cost.

Cuba has set a good example, trucks of American make being widely used in the sugar industry. Brazil will, sooner or later, adopt trucks for the transportation of coffee from the plantation to the shipping point, and the possibilities for the successful use of the motor truck in the enormous chilled beef trade of Argentina are almost limitless.

Car and Truck Exports to Latin America—(Monthly Comparison Table 1918-1919)

		NET RESULTS IN 1919												
		GAIN OR LOSS IN 1919						GAIN OR LOSS IN 1919						
		CARS			TRUCKS			CARS			TRUCKS			
		CARS	TRUCKS	CARS	TRUCKS	CARS	TRUCKS	CARS	TRUCKS	CARS	TRUCKS	CARS	TRUCKS	
Argentina	1919	232	213	206	57	223,005	1,095	21,193	1,193	324,193	1,193	21,193	1,193	223,005
Argentina	1918	388	84	324	79	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Bolivia	1919	11	11	11	11	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Bolivia	1918	226	226	226	226	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Brazil	1919	48	48	48	48	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Brazil	1918	630	630	630	630	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Chile	1919	6	6	6	6	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Chile	1918	73	73	73	73	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Colombia	1919	104	104	104	104	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Colombia	1918	272	272	272	272	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Costa Rica	1919	1	1	1	1	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Costa Rica	1918	1	1	1	1	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Cuba	1919	17	17	17	17	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Cuba	1918	68	68	68	68	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Haiti	1919	13	13	13	13	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Haiti	1918	20	20	20	20	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Guatemala	1919	5	5	5	5	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Guatemala	1918	300	300	300	300	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Honduras	1919	2	2	2	2	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Honduras	1918	912	912	912	912	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Mexico	1919	22	22	22	22	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Mexico	1918	558	558	558	558	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Nicaragua	1919	7	7	7	7	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Nicaragua	1918	265	265	265	265	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Panama	1919	1	1	1	1	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Panama	1918	20	20	20	20	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Peru	1919	31	31	31	31	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Peru	1918	104	104	104	104	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Santo Domingo	1919	13	13	13	13	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Santo Domingo	1918	59	59	59	59	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Panama	1919	460	460	460	460	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Panama	1918	44	44	44	44	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Uruguay	1919	673	673	673	673	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Uruguay	1918	108	108	108	108	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Salvador	1919	101	101	101	101	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Salvador	1918	300	300	300	300	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Venezuela	1919	994	994	994	994	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Venezuela	1918	396	396	396	396	1,195	1,195	21,193	21,193	324,193	21,193	21,193	21,193	324,193
Net gain in 1919		\$450	\$2,500	\$5,475	\$1,195	\$3,000	\$1,195	\$3,000	\$1,195	\$3,000	\$1,195	\$3,000	\$1,195	\$3,000

Net gain in 1919

\$80,555

\$2,015,700

Getting the Employee to Pledge His Part in Management

After making plain to the employee what management, sales and finance mean to the business, the problem is to get him to actually interest himself in these things. In the two preceding articles Mr. Tipper has explained how the American Multigraph Co. visualized the overhead. In this one he tells of the personal work that followed.

By Harry Tipper

THE character of the organization in the American Multigraph Co. was favorable to the work of preparing the ground for the constitutional plan of organization. There are in that plant no aliens, although there are some foreign born citizens. The percentage of illiteracy is very low, sufficiently so to be negligible, and the mixture of races is not great enough to be an important factor.

Because of these facts, the measure of understanding secured after the two years' preparatory work was much greater than what could be expected in a similar time in organizations of a larger size with a mixed racial condition. It is realized in this organization, however, that the educational work has just begun and that it must be continued right through, using the constitutional plan of organization as the means of its continuance so that the employees themselves will have a proper voice in its character and growth.

The fact that it is profitable to spend two years in preparatory work and educational work on this organization, on the study of the employees' point of view, and on matters which would affect the common ground of action in a plant where conditions were so favorable, should be carefully considered by any manufacturer who hopes to establish a co-operative system of legislative machinery in his own plant and expects to do it in five or six weeks.

When the two years of preparation were over and the company felt that the time had come to put in the constitutional plan, a booklet was carefully prepared, dealing with this plan, and the preamble to this booklet was arranged so that it would indicate the reason for the plan, the hopes of the company and the necessity for co-operative agreement and action upon many common matters or organization. There is nothing in the plan at all, or in the booklet, which indicates that the company reserves the right to do this, that or the other, but the booklet is entirely concerned with the character of the organization, the methods of election, publicity, the scope and duties of the various bodies, and, consequently, the co-ordination of the whole matter.

In a long series of booklets, issued to employees by various manufacturers, outlining proposed plans of organization embodying the constitutional, joint council and the separate committee plan, most of them have been written, apparently, in the legal department and have approached the matter from the wrong end, so that the employee was forced to read about the things the new system would not give him before he had any notion what the system would give him.

The booklet distributed by the American Multigraph organization deals with the thing in a logical way, emphasizing the possibilities which are contained in the organization development proposed by the company and indicating the obligations which will arise out of this new development in the co-operation of the workers with the management.

The preamble is given herewith in order to indicate the manner of introducing the subject.

PREAMBLE

In order to provide for and maintain an effective, unbroken contact between the management of The American Multigraph Company and the employees, as well as to institute in our organization the same principles of democracy that have proven so beneficial in our National Government, it has been deemed wise that the following plan of co-operative management become effective March 1, 1919.

In setting forth upon this new idea, but one thought has been uppermost in our minds—to give as far as possible to each employee, regardless of position, a speedy and convenient means of making his thoughts and opinions known. In other words, to create machinery whereby all employees, through their representative bodies, may suggest to the management changes or improvements in conditions and regulations directly affecting their relations with the company; by this means working with the management the same as the stockholders now work through their representative bodies—the board of directors and the active executives.

The success of all business of the future lies entirely in the hands of those who make up its organization, through the co-operation of employees, management and stockholders. Success will be attained in the same degree that those three groups work together. Future problems concern each of us, regardless of what our jobs may be. A business such as ours demands that everyone connected with our organization from top to bottom shall give their best thought to the working out of the problems that come up from time to time.

We believe that the plan as proposed and outlined should help us solve the difficulties arising in our industrial life. We believe that the means provided will restore to industry that intimate touch of management with employees which has become almost impossible to maintain in modern business, due to the larger units with which we work.

By this plan we believe that the management may be kept in close personal contact with all those elements which, when working together in complete co-operation and harmony, will enable the company to

serve the business world with our products with greater efficiency and increased benefits to all concerned.

The rest of the organization plan is not given because it is sufficiently similar to other organization developments of the kind to make it unnecessary to give the clauses in detail.

It should be noted, however, that in this organization no distinction is made between salaried employees and employees who are working on other schedules. No distinction is made between male and female employees.

Instead of dividing the organization into the house and senate, as usually adopted under the constitutional plan, the organization is divided into congress and senate, and the composition of the congress is somewhat different from the usual practice. The first paragraph of the organization of the employees congress indicates this difference.

ORGANIZATION

1. The Congress shall be composed of 24 members, 12 of whom are elected by the employees and 12 of whom are appointed to office by the President.

The usual practice has been to elect a house of representatives, not only entirely composed of workers, but all of the members being elected by the workers. It will be noted that while the congress organization in this case is a congress of workers, 12 of these workers are elected by the employees and 12 elected to office by the president of the company. This is a radical departure in the usual practice.

Another radical departure in the usual procedure is to be observed in the variation in the term of office. In this respect paragraph 6, in regard to the terms of office of the congress, is as follows:

TERM OF OFFICE

6. Beginning with the second election all terms of office shall be for one year, four members being elected and four appointed each year. For the purpose of organization, however, the first Congress shall be made up as follows: Of the twelve elected by the employees, the four receiving the greatest number of votes shall serve for 3 years from the day elected; the next four shall serve for 2 years and the next four for 1 year. The twelve appointed to office by the President shall be divided and serve for terms similar to the elected twelve, the President being required to designate who are the individuals serving the various terms.

The provision in respect of a quorum is evidently intended to secure against a minority of the members initiating any legislation at any meeting and so make it uncertain as to whether legislative action by the congress has been with the approval of approximately the full body. This requires that three-quarters of the total membership must be present at any meeting which convenes and a majority vote of the members present is necessary to pass any measure.

The senate in this particular case includes the production manager, chief engineer, superintendent, advertising manager, sales director, chief inventor, chief inspector, the manager of industrial relations, purchasing agent, auditor, vice-president and the heads of such other departments or divisions as may be established from time to time.

There have been two amendments to the constitution originally presented up to the time when the booklet was prepared. When a measure has been passed by the congress and senate and approved by the cabinet, notification is immediately given to all employees by means of posters set up in the various departments of the plan. In addition, the factory house organ publishes a regular monthly report and complete publicity is given to all measures. The

house organ is in charge of the manager of industrial relations and consists largely of contributions by the various employees in the factory.

In putting the plan into effect, a letter was sent to each employee on Saturday of one week asking them to give the booklet a careful reading between the Saturday and the return to work on Monday. This letter was sent to the homes of all employees. They were asked not only to read it, but to talk about it to their family and their friends, and then asked if they would come Monday morning to the office of the president and tell him whether they thought the company was on the right track.

The reports show that the president personally interviewed, or came in contact with, 98 per cent of the employees in connection with the plan. Most of the workers pledged their support. Many of the workers were neutral and a certain number actively suspicious.

With those who were actively suspicious the president of the company made a deal whereby they undertook to do nothing to question the system for six months, and at the end of six months to appear in the president's office and talk things over with him.

Each employee signed a card stating his opinion of the matter, and all of these cards are kept so that, when the six months are up, all those who commented unfavorably on the plan will be followed up so that they fulfill their promise and register their opinion, whatever it may be. The character of the letter which was sent out at the time of the adoption of the plan, like all the promotion material on this particular application, is interesting, and for that reason we are publishing it.

THE PERSONAL APPEAL

Mary Borna,
City.

I hope you will find time between now and Monday to give the enclosed booklet a careful reading. That's the one big reason why I'm sending it to your home.

The new idea described in the booklet is worthy of your best thought. Talk about it to your friends and family—and when you come in Monday morning I will consider it a big favor if you'll come to my office and tell me whether or not you think we're on the right track.

Will you do that?

From now on, you will be urged to use your brain in working out our problems, just as you are asked to use your hands in producing the work.

It means the beginning of Industrial Democracy, as a basis of management, in the American Multigraph Company. Through the representation provided, your thoughts and suggestions will be considered in the laying out of company policies and regulations.

We expect the plan to produce great things. It will mean progress and benefits to us all. Of course, it is going to add to our responsibilities, too—especially for the representatives and those who are elected to Congress—but the honor will be worth the extra effort.

To me it represents an idea that has taken us many years to work out. I hope it will mean that we can work with greater co-operation and added efficiency.

The biggest result to wish for is contentment. If, through the workings of this plan, cheerfulness and good will toward others can be multiplied, then we need have no fears for the success of Industrial Democracy in our plant.

Just now I want your support. If you think the idea a good one, say so, and then pledge yourself to help make it good! Sincerely yours,

H. C. OSBORN,
President.

The company has gone into this matter thoroughly enough to know that there was sufficient deep-seated sus-

picion among the workers and sufficient lack of knowledge to make it impossible to cure the situation easily. They believe the plan is right and just and that some such plan of action is necessary, but they are not letting themselves be led away by such beliefs in the thought that it will immediately prove a panacea for all their industrial troubles.

They are hoping and believe they have good ground for hoping that the future will solidify this organization into

a very integral, valuable working force for the minimizing of industrial unrest and the elimination of a large part of the personal grievances, but they are quite sure that they have not yet conquered all the suspicion and justified themselves entirely in the eyes of all their employees, and that constant, continual work must be done in order that the progress which has been made so far can be carried forward as the plan works out.

ANNOUNCEMENT EXTRAORDINARY

DR. WALTER ROSENHAIN, D.Sc., F.R.S., of the National Physical Laboratory, Teddington, England, is one of the world's authorities on metals. So it is with much satisfaction that AUTOMOTIVE INDUSTRIES announces that it will publish in the near future an article from Dr. Rosenhain on "The Testing of Materials."

As might be expected, the writer has some rather unusual views on this subject, and in this article he makes a plea for more rational testing, especially for the automotive trade, which is so dependent upon the accurate results from materials used.

Dr. Rosenhain first gained prominence through his work on iron and steel. Later he wrote several authoritative works on optical glass. He has been associated with the International Testing Association and has contributed to the Encyclopedia Britannica and to standard scientific works on metallurgy. He has been superintendent of the Metallurgy Department of the National Physical Laboratories of England (the Bureau of Standards of that country) for a number of years.

Model Experiments and Airplane Design

A SPECIAL committee was appointed in Great Britain some time ago to consider the relation of model results to full scale performance of airplanes. This committee in its report reaches the following conclusions:

(1) For the purpose of biplane design model aerofoils must be tested as biplanes, and for monoplane design as monoplanes. The more closely the model wing tested represents that used on the full scale machine, the more reliable will the results be. So long as certain differences remain unexplained, no high accuracy can be obtained in the prediction or verification of performance at low lift coefficients.

(2) Due allowance must be made for scale effect on parts where it is known. In the case of struts, wires, etc., the scale effect is known to be large, but these parts can be tested under conditions corresponding with those which obtain on the full scale machine.

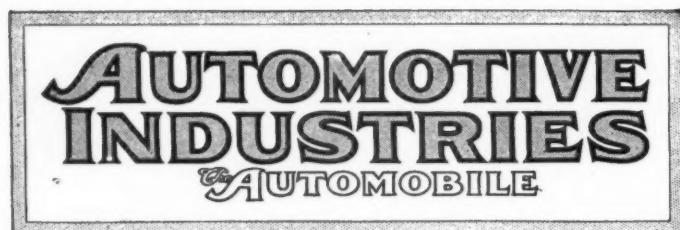
(3) The resistance of the various parts taken separately may be added together to give the resistance of the complete aeroplane with good accuracy, provided the parts—e.g., the undercarriage—which consist of a number of separate small pieces, are tested as a complete unit.

(4) Model tests form an important and valuable guide in aeroplane design. When employed for the determination of absolute values of resistance, they must be used with discrimination, and a full realization of the modifica-

tions which may arise owing to interference and scale effect. In forecasting the performance of a machine of a known type, methods can be employed other than the addition of the resistance of all elementary component parts; every designer has at his disposal the full scale test results of a certain number of types of aeroplanes, and where a new design conforms to any one of these types the most satisfactory point of departure for improvement in design is probably given by these test results. For suggestion as to how improvements can be made, the designer is still dependent on model tests. It is of great importance that such information should be increased, and its use extended by further systematic full scale research.

Disposition of Armistice Trucks

AS to the ultimate disposition of the armistice trucks, the French attached their quota to their transport reserves after passing them through their shops for adjustment and application of rubber tires. It is not known what the Belgians did with theirs. The English were keeping theirs in storage parks at Cologne, and the U. S. Army, except for those issued to engineer organizations, was holding its quota in two parks at Coblenz and one at Treves, pending decision as to the final disposal of American military material in Europe.



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Return of the Transmission Brake

THERE have been distinct signs recently that the transmission brake is gaining in favor among American automobile designers. In no other item of automobile design has there been such a sharp contrast between European and American practice as in regard to the service brake, for while it is the almost universal custom abroad to place the service brake on the transmission shaft, the makes of cars in this country with transmission brake previous to the current season could be counted on the fingers of one hand. There is no apparent reason for this difference in practice, because all the advantages and disadvantages of the transmission brake apply here the same as in Europe.

That the double set of rear wheel brakes gained such a strong foothold in this country is believed to be due to historical reasons. Nothing succeeds like success, and it so happened that one of the earliest distinct successes in the higher priced class of vehicle in this country carried its transmission on the rear axle

and therefore was compelled to have all brakes on the rear wheels. It is sometimes difficult to analyze what are the particular elements of success in a mechanical construction, but it is always safe to assume that if a machine proves successful as a whole, none of its parts can be entirely wrong. Aside from this, it always has some weight with the buying public if the manufacturer of a car can point to certain features which are found also on the most expensive cars.

As to the particular merits of the transmission brake, the most important is undoubtedly that for equal retarding effect it requires much less effort to apply; in other words, it makes for ease of car control. The greater the rear axle reduction becomes with the popularization of high speed engines, the more pronounced this difference will be.

Owing to the fact that the retarding action of a transmission brake must be transmitted through the propeller shaft and universal joints, the bevel (or worm) gearset, differential and rear axle shafts, this type of brake does not possess quite the same reliability as a hub brake, but as there is always a brake of the latter type in reserve for emergencies, this is of little consequence.

For driving in very hilly country, where the brakes must sometimes be used continuously for miles, there is a distinct advantage in having separate brake drums for the service and emergency brake respectively, as the two sets may then be used simultaneously or alternatively, and thus the heating be materially reduced.

Most of the wear is confined to the service brake, and with this on the transmission shaft, adjustment for wear is generally much easier to make, first because only one adjustment is required, and then because the adjusting means are more accessibly located than in the case of hub brakes. Moreover, when relining is required, a single brake can be dealt with at less expense than a double one.

Much has been made in the past of the strains on the transmission members due to a transmission brake. Now, the maximum torque which the brake can impose on these members is that which will slip the wheels under normal road conditions, and this is no more than the maximum driving torque or low gear in any well-powered car. Therefore, the transmission brake cannot possibly subject the transmission members to abnormal strains.

IT is with great pleasure that AUTOMOTIVE INDUSTRIES prints in this issue figures showing that the trade with Latin America was greater by \$2,015,700 from Jan. 1 to July 1 this year than during the same period of 1918.

The importance of this information cannot be better indicated than to relate that, while these figures were in preparation, two exporters visited AUTOMOTIVE INDUSTRIES in quest of certain information regarding export trade. Both were looking for new fields, as they believed that the Latin-American trade "was shot," to quote one of them. Both believed that this field was lost, but a glance at the figures in hand convinced them that there had been no losses but that the foundation of a growing trade existed.

The British Aviation Department

IN further consideration of the recent report of the American Aviation Mission, AUTOMOTIVE INDUSTRIES this week presents an outline of the construction of the British Air Council which has been commended in the Mission's report. The analysis shows that the success of the British plan for the development of commercial aviation is still in question, due to the fact that the Department of Civil Aviation has not yet been formulated and is not actively in operation.

The Department may be so constituted, when it is organized, that it will be separate from all of the others under the Air Council, although the present plans indicate that it will be one of the co-operative departments, co-ordinating all of its affairs and activities with the others which are primarily wartime organizations.

There can be no question but that the Air Ministry functioned successfully during the war, but it was and is a wartime body, and whether it will function as well for peace remains to be seen.

The British plan eliminates specialization, in this age when specialization is counted most important. Military, naval, postal and general civil aeronautics are all combined under one head and, working under the same departments, competition would appear to be eliminated, and this to a degree reduces the development that can be obtained through the competition that would ensue if each department functioned separately. Furthermore it reduces intensive specialization that can accrue through separate military, naval, postal and civil departments, each working on its own problems independently.

Adoption of the British plan would be a step that, with amalgamation of all the departments in our Government which are interested in aeronautics, would be a serious one. It would involve, as in Great Britain, government ownership; it would destroy the possibility of intensive military, naval or postal development. It would make the military aeronautic establishment coequal with the War Department, taking its operation from the War Department in time of war; whereas, experts hold, that military aeronautics should be under the direct command of the Chief of the Army. Likewise it would remove the operation of air mail from the jurisdiction of the post office completely, leaving the post office responsible for the carriage and delivery of mail, but dependent upon the proposed department of aeronautics for its service.

Consequently this country may find it profitable to formulate its policy for future aviation only after deliberate consideration of all of the features involved. There must be prompt evolution of a policy that will be sound and progressive, but yet there must be no hasty passage of bills which, in the end, will only tend to retard or delay the progress of aviation in this country. There should be perhaps a policy evolved which will so frame the governmental aeronautic structure that it will be flexible and can be, as time develops, increased or decreased, given more authority or deprived of power.

There is no question but that immediate consideration should be given to the work of drafting a well defined control system and other federal laws in this country for the promotion of aviation. This subject should be taken up by Congress before haphazard national or state laws are adopted. The legislation can be so framed that it will permit the inclusion of military, navy and postal departments later, if that is found to be advisable.

The British plan should not be adopted without inquiry as to what influence it will have on development of aviation.

New York-Toronto Race Commercial Flying Test

Aerial Contest Simulates Conditions of Cross-Country Lines—

Victory Depends Upon Factors Other Than Speed—

Liberty Engines Make Fast Time

NEW YORK, Aug. 28—The world's greatest aerial race and airplane performance test was under way this week between New York and Toronto. More than fifty machines, representing the highest workmanship of many foreign and domestic makers and piloted both by military and civilian aviators, were competing in the round trip circuit of approximately 1040 miles between the two cities. Controlled stops were being made at Syracuse, Albany and Buffalo and the race was run under imposed conditions of flight that will determine the victor not merely on speed factors but on performance with load, such as the commercial flier might encounter.

The opening starts were made Monday, both from Toronto and New York. The time limit for the circuit does not end until late to-day. But the first planes to finish reached their home hangars late Tuesday afternoon and night, one with an unofficial flying time of 560 minutes and another with a similar time, but fifteen minutes slower for the round trip.

The winner may not be known for several days. Complex calculations, based on horse-power, speed and load, must be worked out for each of the many machines before the judges can award the honors. Some machines did not commence their flights until Tuesday or Wednesday and will not finish until Thursday and, consequently, no prediction concerning the results can be made. Seventeen machines completed their round trips on Wednesday, both at New York and at Toronto, and it is possible that their elapsed times of flight may be considerably less than those of the first to land. Six planes were put out of the race by yesterday's storm. One pilot, Lieut. H. G. Slater, was lost over Lake Ontario during the night and life-saving stations feared he had been lost.

First Landings Close

Lieut. M. J. Plumb, in a De Haviland 4, was the first to land in New York after having completed the double trip. He was followed quickly by Lieut. Belvin N. Maynard in another ship of the same make. But at Toronto, Capt. R. W. Schroeder, who had elected to fly in a Vought VE-7, and had started from that city, brought his plane back home at so nearly the same time that only the judges will decide whether he or Lieutenant Plumb landed the earlier.

The race, when its scope and size are

considered, is without an equal in aviation history. It was staged as a result of a prize of \$10,000 offered by a New York hotel corporation, in co-operation with the American Flying Club of this city. Canadian flying organizations joined in the plan and, with the army aiding to swell the number of entrants, the race was gotten under way.

D. H.-4 Makes Quick Time

"The race will simulate the actual conditions of a commercial airplane passenger and freight route, for it will be run under the same conditions as will prevail in commercial work," said Maj. Gen. Charles T. Menoher, head of the American army service, who acted as starter at the Roosevelt Field on Long Island, the New York starting point. "Regular stops will be made as on a regular aerial line.

"It will enable us to obtain definite data on the performance of the different types of planes. It has been so arranged that both high-speed and low-speed types shall be given a fair opportunity to win the prizes. It is first of all a reliability contest."

The makers represented in the contest were almost as varied as the industry itself. American models predominated. International mail was carried by many of the planes.

A De Haviland 9-A, piloted by Sergeant C. B. Coombs, led the way into New York for the Canadian starters, with Roland Rohlfs, the Curtiss test pilot in an Oriole of that company, but seven minutes behind. Coombs' actual flying time was: Toronto to Buffalo, 38 min.; Buffalo to Syracuse, 62 min., and Albany to New York, 65 min., a total time of 215 min. Counting his imposed stops, he was 6 hr. 21 min. from Toronto to New York. Schroeder, first of the Canadian starters to return to Toronto, announced that his elapsed time from the Canadian field to New York was 6 hrs. 22 min., but was in the air 243 min.

Flying handicaps were numerous, the New York starters having been delayed by a rainstorm, but finally going ahead in the face of intermittent rain, wind and thunderstorms. The proposed flight over New York City, due to these conditions, had to be abandoned, and the fliers made their way to Albany and Syracuse against unfavorable conditions. Several planes crashed or were smashed at various fields, the landing spot at Albany proving far too small to handle

the great number of planes that were continually checking in and checking out of the control station there.

Pilot's Arm Frozen

Only one serious accident, however, had been reported, that having befallen Lieut. Austin Crehore, when his Italian S. V. A. crashed into a tree. Col. William C. Barker, of the Canadian flying force, brought a German Fokker into New York with his left arm, previously crippled in a fight with six Hun planes last October, frozen as a result of the high altitude he attained in "hopping over" a thunderstorm.

Twenty-seven planes started from New York on Monday afternoon. They were: La Pere, one; L. W. F., two; S. E. 5-A, three; D. H.-4, nine; S. E.-5, four; Oriole, one; U. N. 4 H, three; J. N. 4, one; Avro, one; U. N.-8, one, and U. N. 4-D, one. The Canadian planes starting on Monday were: Oriole, two; De Haviland 9-A, one; Fokker, two; Curtiss Standard, one; Vought VE-7, one; D. H.-4, one; J. N. 4-H, one; Canadian Curtiss J. N.-1, one and Canadian Curtiss training, two.

The De Haviland piloted by Plumb, the plane that led the way home for the New York racers, is equipped with a Liberty engine, as was that of Sergeant Coombs, the first of the Toronto starters to reach New York. Schroeder's Vought carried a Hispano-Suiza engine.

Fine Record for Liberty

"We found that the radiator was leaking. There was nothing to do but to come down and we did, luckily, in the middle of a cornfield. We signalled some farmers, who brought us water in milk cans. I borrowed a dish-rag and plugged the leak, filled the radiator and started off. But we ran into three storms."

Maynard, who followed Plumb back to New York, said that he had crossed Lake Ontario in nine minutes, making close to 200 miles an hour. A landing wire on his machine was broken near Syracuse. Coombs, in his Liberty-engined D. H., narrowly missed a serious accident when leaving New York. A tire on one of the landing wheels burst, but the machine was stopped before it was turned over.

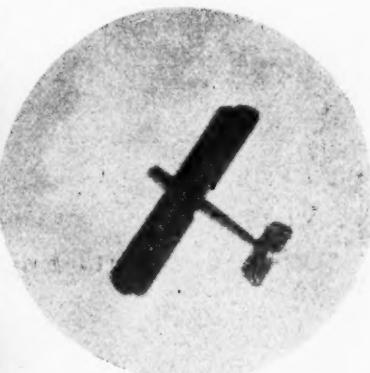
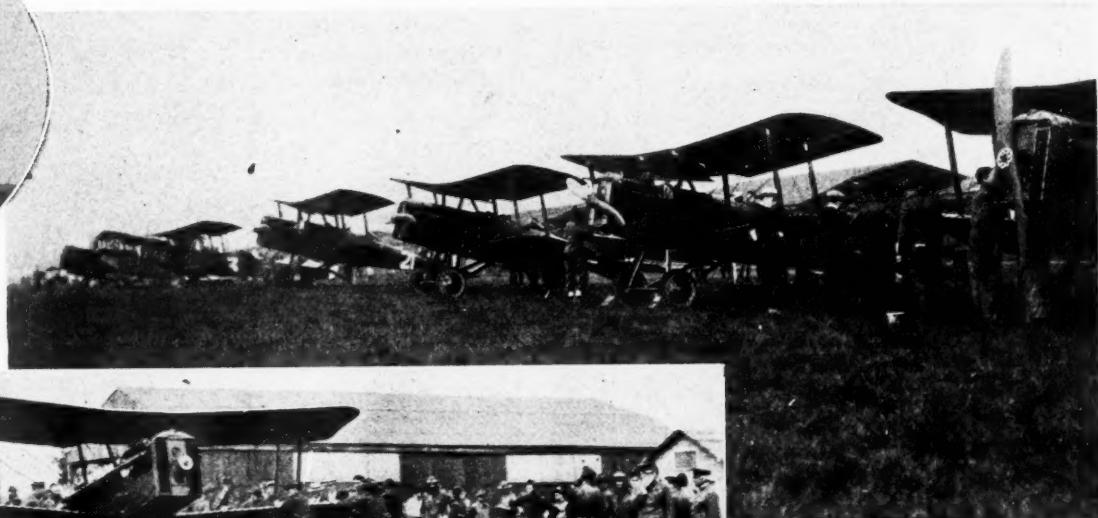
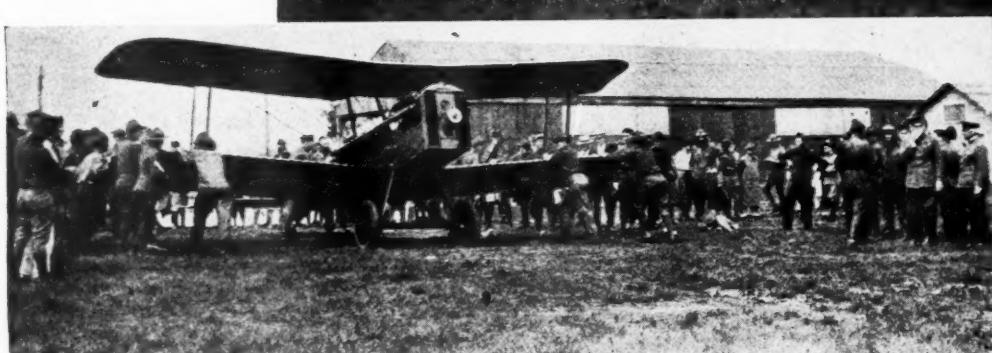
One of the heroes of the race was Captain F. A. Kindley, who crashed his machine into a tree at Albany in order to avert striking three spectators. In his report of the incident, Col. H. C. Hartney, in command at Albany, declared to General Menoher:

"No commendation from you will be too high for Kindley in view of his past record and his presence of mind. Luckily, he was not seriously injured."

Shanghai Exposition

WASHINGTON, Aug. 23—Plans are being formulated to hold an exposition of American and Chinese products at Shanghai the latter part of 1920, for the purpose of promoting trade between the United States and China and of affording buyers an opportunity to become acquainted with commodities which have not been handled in considerable quantities in the past, according to a Department of Commerce report.

Scenes on Roosevelt Field on Starting Day

*A boat race might have been held**A graceful flight**One of the early starters**There were long rows of planes ready for the word**The crowd flowed wherever permitted**The spectators were kept out of danger*

Snapshots as Planes Started for Toronto



Women often said last word of cheer to pilots

La Turette Driggs,
President American
Flying Club

Pilots taking a last look at the maps



A pilot and observer awaiting the word

Maj. Gen. Charles
T. Menoher was
the starter

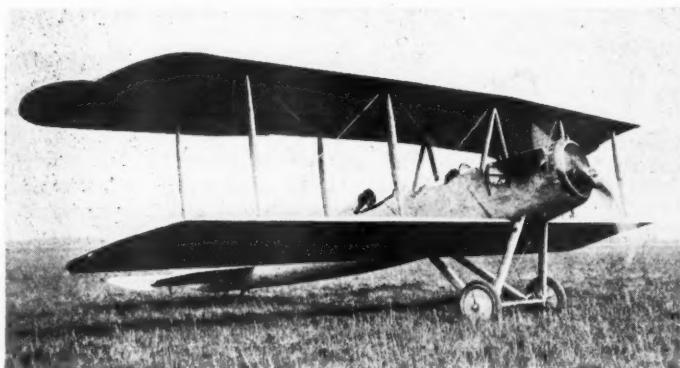
A starting face



Starting one of the De Havilands

Capt. J. N. Foote car-
ries message from Pres-
ident Wilson to Prince
of Wales

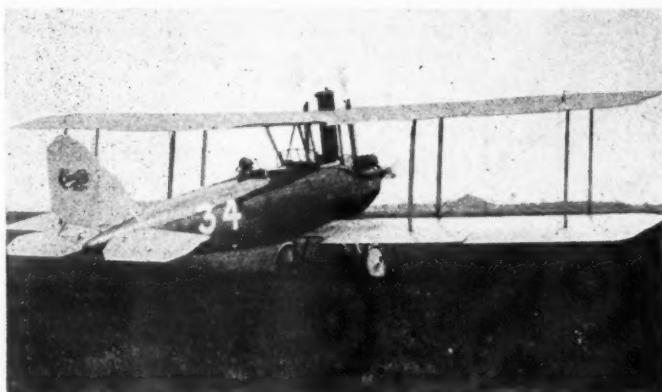
Types of Machines Entered in New York-Toronto Race



An L. W. F.



The SE-5



Curtiss Oriole



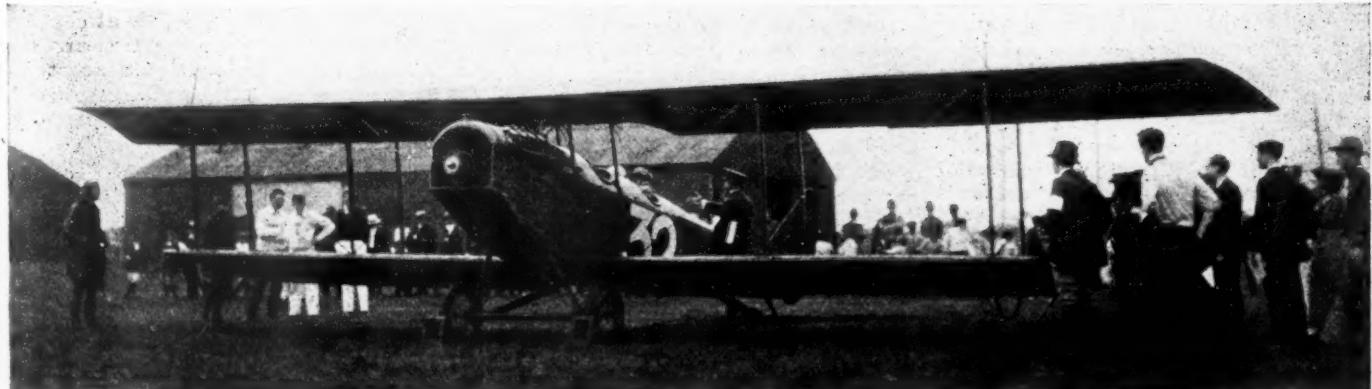
The La Pere



Training plane entered by Roy Carger



De Haviland type



Curtiss JN-4D

Britain Lifts Ban On Motor Imports

American Makers May Ship Free- ly to England After September 1

WASHINGTON, Aug. 27—Great Britain has repealed all restrictions relating to the importation of motor trucks, passenger cars, motorcycles and farm tractors, the repeal taking effect Sept. 1, according to a report from the Department of Commerce. This means that American manufacturers of these automotive products can now ship freely to Great Britain.

It is reported at the same time, however, that the complete abolition of restrictions may only be temporary. A new ration plan allowing cars and trucks to be imported in proportion to the average amount imported in the years 1912-13-14-15 may be arranged.

Up to the present time importations have been rationed on the basis of 50 per cent of the 1913 imports in average monthly quantities up to Sept. 1, 1919.

Motor Train Wins Across Salt Desert

NEW YORK, Aug. 27—Fighting the sands and dreariness of the Great Salt Lake Desert, the transcontinental train of the Army's Motor Transport Corps negotiated last week the 250 miles between Salt Lake City, Utah, and Ely, Nev. That stretch was the most dreaded, perhaps, of the cross-country route, according to information reaching here, and was made only after tremendous difficulties.

As described by men on the trip, it was made through clouds of low-hanging penetrating dust and extreme heat, over a deplorable desert trail, with alkali dust and fine sand up to two feet deep on the level but with numerous hidden holes in a country that has had no rain for more than four months. Drivers were able to find no material, except sage brush, with which to make wheel paths and the personnel was kept busy jacking up and digging out the vehicles that sank into the sand.

At one time the convoy was put under water rations of one cup for each man for the night meal and fears were entertained that the supply of gasoline would give out. Finally, however, a tank truck got through to Gold Hill, which was 30 miles from the night camp, and returned with sufficient fuel. Two tanks of water also met the convoy and the worst experience of the men was ended.

Several detours from the expected trail were made, one of which took the train over a salt marsh with a thin, hard crust of sand and crystallized salt. Practically every vehicle became mired to the body and the removal to hard ground required the utmost efforts of the entire personnel from 2 o'clock in the afternoon until 4 o'clock the next morning.

Some mechanical troubles put the Miller tractor out of commission and it had to be returned to Salt Lake City and from there was shipped in advance of the convoy. All other mechanical difficulties that have arisen, either major or minor, have been taken care of by the train.

The next objective is Eureka, Nev., and it is expected that good roads will prevail to the Coast.

Workers Increase As Wage Ascends

WASHINGTON, Aug. 23—Wages in the automotive industry increased from the average weekly individual wage of \$18 in 1915 to \$17.08 in 1916, \$19.54 in 1917, \$23.01 in 1918 and \$25.74 in 1919, according to figures made public by the Department of Labor.

This shows an increase in five years of 45 per cent. The cost of living in the same period, according to the Department of Labor, has increased from 100 per cent taken as normal in 1914 to 177 per cent in 1919. The department has figures which would tend to show that the cost of living is decreasing slightly and that the peak was reached in December, 1918, when it was 89 per cent higher than in 1914, as compared with an increase of 77 per cent in March, 1919.

An increase of 15.8 per cent in the number of workers in the automobile industry, and an increase of 31.4 per cent in the wages paid, is reported for May, 1919, as compared with May, 1918, by the same department. Forty-two automobile manufacturers employing 92,136 workers in May, 1918, increased this number to 106,725 in May, 1919, an increase of 15.8 per cent. The same number of manufacturers increased their payroll from \$2,433,548 in May, 1918, to \$3,197,207 in May, 1919, an increase of 31.4 per cent.

Thirty-nine manufacturers increased their organizations from 96,355 workers in April, 1919, to 100,676 in May, 1919, an increase of 4.5 per cent., while at the same time wages increased from \$2,829,255 in April to \$3,015,604 in May, an increase of 6.6 per cent. A wage increase of 15 per cent was granted to 92 per cent of the employees at one establishment, according to reports received by the Department, while at the same time the whole force in another plant received an increase of 50 per cent, and half of the force in a third plant were given a 5 per cent increase.

One firm reported increases of 5 cents per hr. to 3 per cent of the force, and 2½ cents per hr. to 5 per cent. The average hourly rate in one establishment was increased 0.039 cent.

CHANGE IN NAME

CHICAGO, Aug. 26—The Turner Advertising Co. has changed its name to Johnson, Read & Co., 202 South State Street.

Increase in Federal Aid for Road Work

Expenditures for 1918 Amounted to \$300,000,000—Plan to Complete Old National Road

WASHINGTON, Aug. 25—Since early in 1919 there has been a steady increase each month in the Federal-aid business in the Bureau of Public Roads of the United States Department of Agriculture. States in all sections of the country are filing their projects.

Based on complete reports from forty-four of the states, cash expenditures on the rural roads and bridges of the United States for the year 1918 amounted to \$286,098,193. To this should be added the value of statute and convict labor which cannot be fixed with any great degree of accuracy but probably amounted to not less than \$14,000,000, making the total expenditures for the year \$300,000,000. This total is made up of the actual expenditures for such items as labor, materials, supervision and administration directly connected with the construction, improvement and upkeep of public roads and bridges outside the limits of incorporated towns and cities, and does not include any item for sinking fund payments or redemption and interest on road and bridge bonds.

Old National Road to Be Completed

A project under the Federal Aid Road Act, filed with the Bureau of Public Roads, contemplates, after the lapse of nearly a century, the completion of the Old National Road, extending from the Potomac to the Mississippi, which already has been largely improved as far west as the Indiana line. The Illinois improvement will extend from East St. Louis across the State to the Indiana line, traversing St. Clair, Madison, Bond, Fayette, Effingham, Cumberland and Clark counties.

The proposed type of surface is monolithic brick and concrete pavement, the average cost of which is about \$30,000 per mile. The proposed improvement includes also the construction of forty bridge structures, of lengths ranging from 22 ft. to 300 ft. At present the uncompleted portion of the highway is generally an unimproved earth road, which becomes nearly impassable at certain seasons of the year. There are, however, near some of the villages, short stretches of macadam pavement, generally in very poor condition. The local traffic consists of approximately 60 trucks, 700 motor vehicles and 50 horse-drawn vehicles per day, to which is added during the summer months a through traffic of about twenty trucks and 200 passenger motor vehicles.

KEELER BRASS ADDITIONS

GRAND RAPIDS, MICH., Aug. 26—The Keeler Brass Works is building additions of 75 x 100 ft. to two of its buildings.

Makers Crowd The Canadian Showing

Toronto Exposition Points Out Possibilities of Dominion Trade

TORONTO, Aug. 25 (Special Correspondence)—Canada's only National Motor Show was opened here to-day by H. R. H., the Prince of Wales, in conjunction with the formal opening of the Canadian National Exhibition.

Forty passenger car manufacturers, twenty-nine truck makers, upwards of a hundred automotive equipment manufacturers, and many tractor, airplane, motor boat and motorcycle manufacturers are represented. Owing to the far from adequate space a large number of would-be exhibitors are scattered through the numerous buildings that make up Exhibition City. Applications far in excess of space available in the Transportation Building and the three annex hangars were received four months ago.

Automotive Palace Wanted

It is freely predicted that the Automotive Industries of Canada (The National Automobile Chamber of Commerce of the Dominion) will hereafter withdraw, not only their designation "Only Canadian National Motor Show," but also their sanction and support from the Canadian National Exhibition event unless the much heralded Automotive Palace, with quadruple or quintuple the accommodation afforded by the Transportation Building, is not constructed before another year rolls by.

As this is the first post-war National Motor Show and the first collective showing of post-war, new-season (1920) models, and as no other country holds its various national automotive exhibits concurrently and at the same place, the Canadian National Exhibition event takes rank as one of the largest automotive displays.

No European Models Shown

Owing to transportation and labor difficulties, not one of the British, French or Italian car manufacturers has been able to get cars here in time for the show. Wolseley, the first of these to reserve space, does not now expect to place models on the Canadian market before next spring, and Fiat, the last of European manufacturers to make application, may not now be in a position to deliver cars here before late fall or early winter.

Car and truck sales continue as briskly as production permits, demand far out-reaching supply. Most showrooms are denuded of cars and have been for months. Manufacturers, distributors and dealers individually and in their conventions have declared that fall and winter sales will be on an unprecedented high level—that the car famine conditions can not be more than slightly alleviated for a year and a half and not reduced to normality within from two to three years.

Canada is basking in the sunshine of unexampled prosperity and here the nation-wide building of good roads assures an ever increasing demand for cars.

Canada's Wealth High

The per capita wealth of Canada today is the highest in the world—high enough to offset the sixty odd per cent Canadians must pay for cars above the United States market price. That, combined with the economical need for cars in the Dominion, is the reason given by some of our most astute manufacturers, dealers and distributors for believing that, per capita, Canada will yet equal the United States in being automotived.

It is sanguinely predicted that over eight hundred thousand will attend the National Motor show during the next two weeks. Last year over six hundred thousand passed through the Transportation building.

DETROIT ISSUES NEW STOCK

DETROIT, Aug. 25—The Paige Detroit Motor Car Co. is offering \$3,000,000 7 per cent preferred stock, the proceeds from which are to be used to defray the cost of erecting a new building. The company now has outstanding about \$1,000,000 of an authorized issue of \$1,500,000 7 per cent cumulative preferred stock so that the issuance of an additional \$3,000,000 will probably call for a meeting of stockholders.

AJAX EXPANSION

NEW YORK, Aug. 23—To provide additional working capital and for the construction of a new factory, the directors of the Ajax Rubber Co. voted to increase its capital by issuing 36,000 shares of capital stock, completing the total authorized capital of 200,000 shares, and to offer this stock to stockholders at \$70 per share.

A quarterly dividend of \$1.50, payable Sept. 15 to stockholders of record Aug. 30, was also declared.

ADVERTISING IN DUTCH INDIES

WASHINGTON, Aug. 23—American advertising agencies which place advertisements in the Dutch East Indies often refuse to pay when specifications, with which the paper cannot comply and which have not been understood because written in English, are not filled to the letter, according to a statement made by publishers of local newspapers in the Dutch East Indies.

The situation is unfortunate, and it is important that those who place advertisements should make sure that there is complete understanding of the terms and that misunderstandings are treated liberally, according to a Department of Commerce report.

APPROVE FOREIGN BRANCHES

WASHINGTON, Aug. 26—Secretary of the Treasury Glass has given his official approval to Senator Edge's bill to authorize branch banks in foreign countries under control of the Federal Reserve Board.

Three Cars Named For British Plan

New Import Apportionment Allows Entry for Ford, Studebaker and Overland

LONDON, Aug. 12 (Special Correspondence)—The American apportionment of the 5000 cars which the British Government will allow to be imported, in addition to the former rationing scheme, have been apportioned as follows:

Ford	2579
Studebaker	769
Overland	494
Total	3842

The rest of the 5000 are to come from the French and Italian makers. It was at first presumed that the American factories would get the entire allowance.

The American figures are proportional to the total imports during the years of 1912 to 1915, inclusive.

American importers here have been greatly disappointed by the failure of the Government to give them a definite statement on what they may expect in the way of business prospects beyond this allowance, which was undoubtedly made to partially meet the public demand for cars. British manufacturers are still struggling with slow production and are keeping up demands that their industry be protected by keeping out cars of foreign makes.

Truck Development Tour Does Practical Hauling

DES MOINES, IOWA, Aug. 28—The motor truck development tour of the National Association of Truck Sales Managers has completed its third week.

The tour is getting down to practical work in hauling goods to, from and about the farm, and at practically every stop lectures on motor haulage are delivered.

The enterprise so aroused enthusiasm among Iowa dealers that it was decided to hold a state truck tour, leaving Des Moines, Oct. 13.

LIBERTY BUILDING READY

DETROIT, Aug. 26—The first unit of the group of new factory buildings being erected by the Liberty Motor Car Co. is nearing completion and is practically ready for occupancy. The new building will house the closed body mountings, experimental and service departments as well as a restaurant for employees. Arrangements are already being considered for enlarging this building in the spring.

AUTOMOTIVE PLANT ADDITIONS

DETROIT, Aug. 26—The Parker Rust-Proof Co. will erect an office and factory on Milwaukee Avenue and the Cadillac Motor Car Co. will put up a machine-shop at 902 Scotten Avenue.

British Without Low Priced Cars

Analysis of Australian Market Shows Lack of Such Models

LONDON, Aug. 5 (Special Correspondence)—The *Times* of this date publishes a note from its Sydney correspondent to the following effect:

"Major Goddard, a delegate jointly of the British Board of Trade and the British Allied Motor Manufacturers, after a thorough inquiry, is confident of a big future for British motors cars in Australia, and also of the tremendous opportunities for commercial vehicles and tractors. He believes it will be possible to manufacture cars in India and land them in Australia at a cost of £300 (\$1,500), and others in England and land them at a cost of £450 (\$2,250), which will compete advantageously with the most popular American cars.

"Major Goddard is convinced that it would be possible to supply the whole of the Dominions, India and the West Indies. The Federal Government is being asked to give British cars at least 25 per cent preference over those of foreigners."

It will be noted that the Indian-British car is to be placed on the Australian market at \$1,500 against \$2,250 for the British home-built car. The Australian market apparently is to be served with cars built by rice-fed Indians paid about 8 annas a day (16 cents).

But Major Goddard hopes for a British car to be delivered in Australia at but £150 (\$750) more than the rice-built Indian. At present there is no prospect of such a car being forthcoming here. In fact, the cheapest car at present being produced (not on paper, as so many of the mass production cars are) is listed

at about £700 (\$3,500) and, even granted a drop in price within the next eighteen months, the price here will be little below £400 (\$2,000). Besides, Australia and the whole continent of British Australasia is peopled with young men who already have their schemes for a home production of motor vehicles.

They have put a stiff tariff on motor bodies or cars imported with body work complete, this with the obvious object of building up a motor-body industry. Therefore it is not at all probable that such people, among whom trade unionism is strong, will tolerate the import of cars built by rice-fed cheap Indian labor.

Moreover, Major Goddard must not overlook the fact that the American car trade is so strongly entrenched in the Australian market that it is not likely to be displaced as easily as he seems to infer by a cheap Indian import and a 25 per cent preference tariff.

Minerva Factory Guaranteed Against Future Strikes

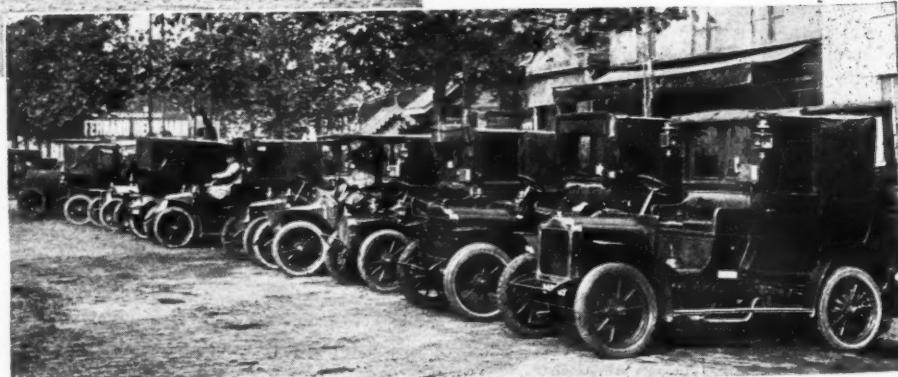
BRUSSELS, Aug. 6 (Special Correspondence)—After being on strike for nearly three months, the workers in the Minerva automobile factory have returned on rather curious conditions. The Government intervened, and it was ordered that the men should resume work under the old scheme of pay, and in addition they should deposit 5 per cent of their wages weekly until one month's salary was in hand to be held as a guarantee against future strikes.

TESTING GERMAN TRUCKS

WASHINGTON, Aug. 23—The Motor Transport Corps has begun its work of examining and testing the forty-seven German trucks which have been shipped to this country.



Owing to a shortage of desired styles of motor cars in Paris, Ford machines are used extensively as taxicabs. A line of Fords awaiting customers is shown in the upper picture. A line of privately owned taxicabs is shown in the lower photograph awaiting supplies at a benzol station. Note the nondescript appearance of the cars.



Belgian Makers Cannot Have Palace for Show

BRUSSELS, Aug. 7 (Special Correspondence)—By reason of the obstinacy of military authorities, the Belgian automobile manufacturers have had to abandon hope of securing the Cinquantenaire Palace for their motor show next December. This hall, which is in one of the best districts of Brussels, is the only one sufficiently large to house the automobile exhibition.

During the war, it was used by the Germans as a motor transport depot. Since the armistice it has passed into the hands of the Belgian military authorities who do not show any inclination to evacuate it in time for the national automobile show.

In consequence of this it is quite probable that the Belgian show will be held in a number of smaller buildings.

PLANE FASTER THAN CABLE

LONDON, Aug. 7—(Special correspondence)—Officials of D. Napier & Son, Ltd., are pointing out an unusual fact in connection with the recent non-stop flight from London to Madrid of a Napier motored Alliance airplane. The flight was made in 7 hr. 45 min., whereas the cablegram announcing the arrival of the plane at Madrid did not reach the Napier office until 15 hr. 30 min. after it was filed.

AMERICAN EXPRESS AIR ROUTE

NEW YORK, Aug. 25—The American Express Co. is completing arrangements for daily air passenger and baggage service between London and Paris. The fare is to be \$100 for a flight one way in a plane carrying one or two passengers, and \$60 per person in a light air bus carrying fifteen passengers.

Unusual Taxicab Situation in Paris

Paris Cabs Show Service Economy

Gas Consumption Is Low and Tires Are Changed on Saving Basis

PARIS, Aug. 1 (Staff Correspondence)—The taxicabs of Paris, carrying from 2 to 4 passengers and baggage, in addition to the driver, average 20.4 miles to the American gallon under city conditions. On long straightaway and suburban runs the average consumption is at the rate of 23 miles to the American gallon.

These figures were issued by Engineer Van der Veldt, of the Compagnie des Auto-Place, which claims to be the oldest and the biggest taxicab company in the world, with a fleet of 4100 cabs here and 3600 at London. This company, which started operation in Paris in 1905, makes an almost exclusive use of Renault twin-cylinder taxicabs, having a bore and stroke of 3.1 x 4.7 in. This type of engine was adopted because of the fact that gasoline costs are very high in Paris and the utmost economy in fuel has had to be observed.

Benzol Used Exclusively

The driver buys his fuel from the company and pays for it before taking his cab out. This system has had to be adopted in order to protect the interests of the company and to guard against the theft of fuel, or the use of vehicles for private purposes. Benzol imported from England and America is the only fuel used. This now is being sold to the drivers at the rate of 4 francs for the first 10 litres (equivalent to 30 cents per American gallon) and 3 francs 50 for each additional quantity of 5 litres. The rate, roughly, is 30 cents per gallon for the first 2½ gallons and 54 cents for each additional gallon. The lower of these two rates is the pre-war price, and even the higher rate is much cheaper than the private individual can purchase benzol in France.

The retail figure for benzol outside the city of Paris now is 65 cents per gallon. These low prices are possible because the Auto-Place Company purchases all its own benzol and lubricating oils at the source of supply and brings them into France for the use of its cabs.

Company Guarantees Mileage

As the taxicab company sells fuel to its drivers, it is obliged to guarantee the consumption of the engines. This guarantee is at the rate of 18.3 miles to the gallon. The fact that this consumption is not equaled is proved by the almost complete absence of complaints. Tests made by the company's own mechanics, driving under normal traffic conditions, show that the mileage is in all cases more than 20 to the American gallon. If any driver claims that his cab is not equaling the mileage guaranteed by the company, he is entitled to call for a test, and if this test proves that the claim is correct his carburetor is put into condition

and he is paid for all lost time. If, on the other hand, it is proved that the complaint has been made lightly, the driver is laid off for two weeks. Whenever these claims of high consumption are recognized, it is nearly always found to be due to leaky connections.

The use of benzol in place of gasoline is entirely satisfactory. The fuel has to be up to a standard specification imposed by the company, and on condition that this standard is adhered to there is no corrosion of metals or other ill-results. It should be noted that the choice of benzol in place of gasoline has been adopted not by the company but by their drivers. The taxicab garages are outside the walls of the city of Paris, and to get into the city, where practically all the running is done, a local tax has to be paid. This tax is 50 per cent higher on gasoline than on benzol. Naturally the drivers will not use any fuel that has to meet the higher tax. The Auto-Place Company alone consumes 12,000 gallons of benzol daily for the 3000 motorcabs it has in regular service in Paris. This is at the rate of 4 gallons per cab and corresponds to 80 to 90 miles running per cab per day.

It should be pointed out that in addition to this company practically all other Paris taxicab concerns use benzol, and the same fuel is employed by the Paris General Omnibuses, which has a monopoly of the motorbus service in the city of Paris.

Tire Operation

The method of tire operation by the Auto-Place Company is always to put new tires on the rear wheels and never to run anything but repaired tires on the front wheels. The tire size employed is 810 x 90 (32 x 3½ in.). One steel stud and one plain tread tire are used at the rear. The steel studded tires average 3400 miles on the driving wheels and the plain tread 3200 miles. This is not the complete life of the tire, however, for, owing to the rule that a repaired tire must never be fitted at the rear, casings are moved to the front wheels when they are really in good condition. No very accurate account is kept of front wheel mileage, for this is looked upon as extra mileage. It is estimated, however, that, after its normal service on the rear, every tire is good for 4300 to 4400 miles on the front wheels. It was found to be poor policy to fit new tires at the front, for they gave very little more service than the tires which had previously been in use on the driving wheels.

The Auto-Place Company makes all its own tires and carries out all its own tire repairs. When it is considered that the Paris taxi-driver is the most reckless in the world, driving hard and braking hard all the time, the results obtained would indicate that the quality of the tires does not leave much to be desired.

Although Renault originally supplied the cabs, the company makes all required parts in its own shops, so that at the end of five years' service, which is

French Makers Plan Heavy Oil Engines

New Import Duty Turns Attention of Makers to Diesel Type

PARIS, July 28 (Staff Correspondence)—An important development is about to be given to the use of heavy oil engines by a law just passed reducing import duties on crude oils from \$24 to 80 cents a ton. Under this law, crude oils are now treated in exactly the same manner as coal. Owing to prohibitive duties, heavy oil engines have been very little used in France, and practically no oil has been used for heating in connection with manufacturing process or with buildings.

It is believed that a number of French automobile manufacturers will turn their attention to the construction of Diesel and semi-Diesel engines. Among those who have announced their intention of taking up the manufacture of this class of engine are: Gnome, Bellanger, Delaunay-Belleville, and Ballot.

There undoubtedly will be considerable development now in engines for ships and fishing boats. In the past any enterprise in this connection has been killed by reason of the high duties imposed on crude oils.

The Government General Petrol Committee has voted a resolution that the petrol and mechanical industries should make a determined and combined effort to encourage the use of liquid fuel for general heating purposes.

NEW FIAT PLANE RECORDS

NEW YORK, Aug. 25—Two new airplane records recently were made in Italy with Fiat BR planes, according to information received by Fiat representatives here. The first was a flight by Lieut. Brack-Papa, who, flying with two passengers, made a new speed mark of 255 kilometers an hour, at the Campo di Mirafiori at Turin. On July 12, the same pilot, flying the same model machine equipped with a Fiat 700-hp. 12-cylinder engine and carrying one passenger, flew from Turin to Rome, a distance of 362 miles, in 2 hr. 15 min. The average speed was 161 m.p.h. The previous speed record for machine carrying passengers was given by the Aerial Club of Italy as 230 kilometers an hour, while the former Turin-Rome time was 2 hr. 50 min.

the normal life of a cab in Paris, there is practically nothing in the vehicle which came out of the Renault factory. Probably the company will later build its cab completely. New designs have been studied, but although there is a preference for the four cylinder engine, owing to the longer life which will be obtainable from the transmission, this will not be adopted unless it is shown that the gas consumption is almost as good as that of the present twin-cylinder cabs.

Seek Closer Union With Gas Producers

Joint Committee Asked for Flexible Specifications—Expect Satisfactory Fuel

NEW YORK, Aug. 23—The first step for co-ordination of the automotive and the fuel industries was taken here the night of Aug. 21 at a joint meeting and dinner of representatives of national associations of the two lines, with John N. Willys, of the Willys-Overland Co., as chairman of the motor representatives. Discussions brought about statements of problems of production, both of gas and of cars, that will result in later technical studies in an effort to solve the problems that have arisen.

Program of Study and Research

The meeting was the forerunner of what is expected to constitute a well-defined program of study and research. No such efforts previously have been made, each industry working entirely independently of the other and each having little particularized knowledge of the requirements or problems of the other. The meeting here, which was held at the

University Club, resulted in pledging the support of the various organizations involved, with their technical laboratories and equipment offered for a combined research for assuring future supplies and for utilizing this supply most efficiently and satisfactorily.

The associations participating were, for the gas producers, the American Petroleum Institute, and, for the automotive industry, the Society of Automotive Industries, the National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers' Association.

Men Present

The oil men present were Henry L. Doherty, of Henry L. Doherty & Co., who acted as chairman of that section; Dr. William M. Burton of the Standard Oil Co., of Indiana; R. B. Leonard of the Atlantic Refining Co.; Frank Howard and B. M. Clark of the Standard Oil Co., of New Jersey, and R. L. Welch and C. C. Smith, general secretary and assistant general secretary of the petroleum institute.

The automotive representatives were, in addition to Willys, K. W. Zimmerschied, assistant to the president of the General Motors Corp.; Coker F. Clarkson and Herbert Chase, general man-

ager and assistant secretary of the Society of Automotive Engineers; Alfred Reeves, general manager of the automobile chamber of commerce; M. L. Heminway, general manager of the accessory association; Walter C. Baker and John G. Utz, of the Standard Parts Co., and F. C. Mock, of the Stromberg Motor Devices Co.

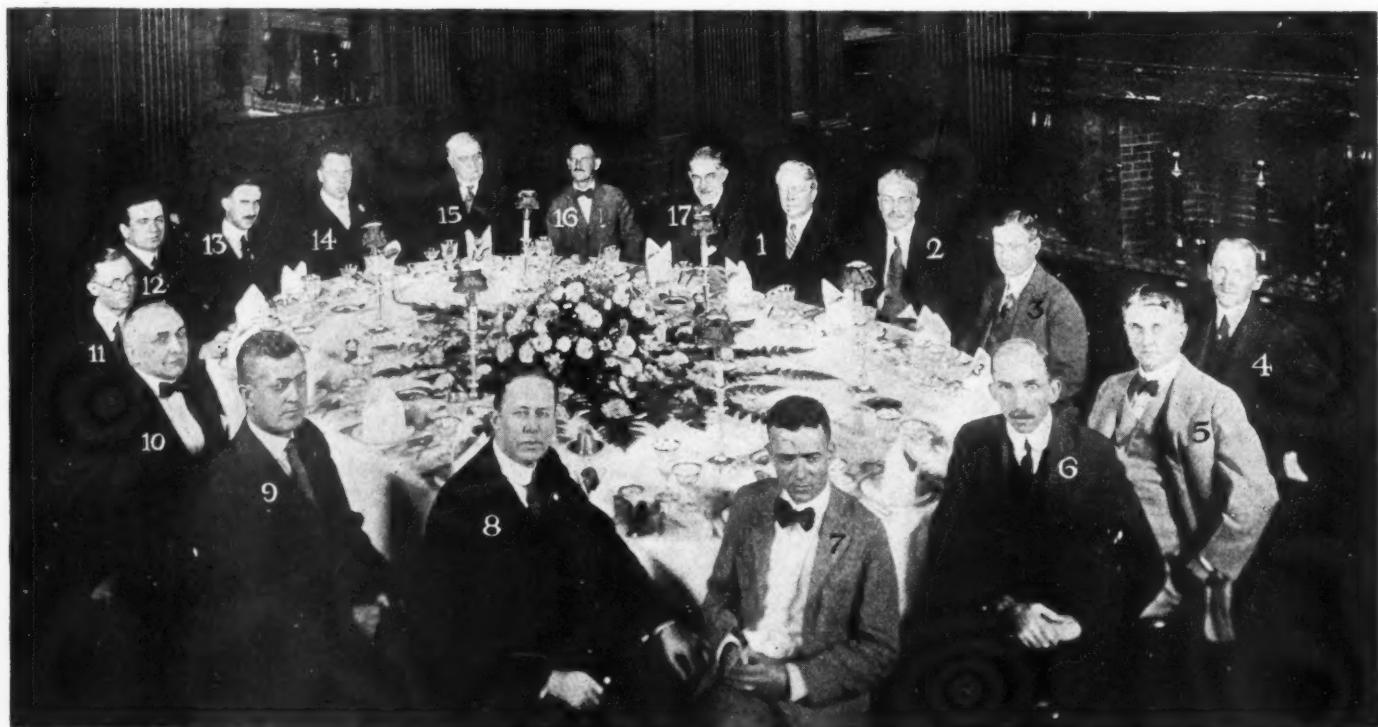
Clarkson stated that much research was yet necessary to determine fully the problems of engine combustion, but added that present information indicated a further study would enable the production of a satisfactory engine fuel by cutting deeper into the crude oil than is at present possible.

Flexible Fuel Specifications

Fuel specifications were discussed, but speakers agreed that a fixed specification would be detrimental both to producer and consumer. A flexible specification was asked that might be changed as exigencies of the fuel supply and demand might demand. This, it was declared, would permit the automotive manufacturer to design his product in a manner that would utilize the fuel most satisfactorily.

Further work that will be done by the joint body was expected to take the study along more specific lines.

Fuel Producers Met the Automotive Representatives



The photograph above shows the dinner given at the University Club at New York last week at which co-operation was planned between the fuel and automotive industries. Those in attendance were: 1, John N. Willys, Willys Overland Co.; 2, Dr. William M. Burton, Standard Oil Co. of Indiana; 3, K. W. Zimmerschied, assistant to the president, General Motors Co.; 4, R. B. Leonard, Atlantic Refining Co.; 5, M. L. Heminway, general manager, Motor and Accessory Manufacturers' Association; 6, B. M. Clark, Standard Oil Co. of New Jersey; 7, F. C. Mock, Stromberg Motor Devices Co.; 8, C. C. Smith, assistant general secretary, American Petroleum Institute; 9, John C. Utz, Standard Parts Co.; 10, Walter C. Baker, Standard Parts Co.; 11, Herbert Chase, assistant secretary, Society of Automotive Engineers; 12, R. L. Welch, general secretary, American Petroleum Institute; 13, Frank Howard, Standard Oil Co. of New Jersey; 14, Coker F. Clarkson, general manager, Society of Automotive Engineers; 15, W. H. Isom, Sinclair Oil & Refining Co.; 16, Alfred Reeves, general manager, National Automobile Chamber of Commerce, and 17, Henry L. Doherty, of Henry L. Doherty & Co.

Details of New Lincoln Car Expected Soon

DETROIT, Aug. 25—Details of the new automobile to be manufactured by the Lincoln Motors Co. will be given out within ten days, it is said here, although officials of that company are withholding information and set no time as to when the announcement will be made.

Recently a general sales manager and purchasing agent were engaged to begin their work Sept. 1 and it is known the employment department has been combining the city for expert machinists. During the summer the automobile machinery and tools were installed in the Lincoln plant. The factory organization is now being perfected.

The new car, it is reported, will be an 8-cylinder model, with V-type engine and weighing about 3200 lb. The price will be around \$2,500, it is said.

NEW YORK REGISTRATIONS

ALBANY, N. Y., Aug. 23—Figures announced to-day by the Secretary of State, covering the first six months' registration of motor vehicles in New York State show an addition of over 68,000 compared with the six months ended Aug. 1, 1918. Commercial cars have increased over 13,000, but motorcycles have decreased by over 4,700. On Aug. 1, 1919, New York State had a total motor vehicle registration of 504,771.

Comparative figures between Aug. 1, 1918 and Aug. 1, 1919, show an increase as follows:

Vehicles	Aug. 1, 1919	Aug. 1, 1918	Increase
Passenger	398,560	346,100	52,460
Omnibuses	19,056	16,859	2,197
Commercial	83,076	69,160	13,916
Trailers	1,633	1,887	Dec. 254
Motorcycles	21,626	26,415	Dec. 4,789

In the first six months of 1918, the State automobile bureau collected \$4,621,015, which is \$607,136.50 less than so far this year. The last six months, as compared with all of last year, show an increase of 32,686 in passenger cars; 951 in omnibuses; 7767 in commercial cars, with a decrease of 585 in trailers.

Total receipts of the motor vehicle bureau on Aug. 1 this year amounted to \$5,228,151.50, an advance of \$282,854 over all last year, when the receipts were \$4,945,297.50.

CHAMPION CANADIAN FACTORY

TOLEDO, OHIO, Aug. 25—The Champion Spark Plug Co. is erecting a factory in Windsor, Ont.

France Plans Huge Fund for Highways

PARIS, Aug. 9 (Staff Correspondence)—A total of \$377,800,000 will be spent on French roads, if the project now before Parliament is approved. This scheme provides for an expenditure of \$142,000,000 on the re-making of roads in the old army zone. In other regions of France, the expenditure is \$51,800,000 for road repairs. Improvements in various parts of France, in order to fit the

roads for modern traffic conditions, call for an expenditure of \$184,000,000.

It is interesting to note that under the expenditure on road repair in the army zone there are \$7,000,000 for roads destroyed by the American army. These, although comprised in the army zone, are mostly roads a considerable distance to the rear, which were used by the American Service of Supply. Bridges numbering 2,050 have to be re-built in the army zone at the expenditure of \$18,000,000.

The following is the detail of the proposed expenditures:

ARMY ZONE	Cost
Macadam roads, 65,000 miles	\$100,000,000
Paved roads, 4,200,000 square yards	17,000,000
Repair of roads throughout France destroyed by American Army	7,000,000
Bridges, 2050 to be built	18,000,000
Total	\$142,000,000

OTHER REGIONS	Cost
Repair of National Highways and completion of work begun before the war	\$ 11,800,000
Repair of macadam roads	37,000,000
Repair of paved roads	3,000,000
Total	\$ 51,800,000

IMPROVEMENTS	Cost
Improvements to roads to fit them for modern traffic (1200 miles of national highway to be paved)	\$ 60,000,000
Tar macadam for 2400 miles of road	72,000,000
Heavy traffic roads, 1200 miles to be tar macadam	30,000,000
Ordinary road to be improved, 3400 miles	22,000,000
Total	\$184,000,000

Suit Against Hudson on Contract Claim

DETROIT, Aug. 23—Lewis Geyler, formerly Chicago distributor for the Hudson and Essex lines, has filed suit for \$800,000 damages against the Hudson Motor Car Co. and the Essex Motors.

The suit arises out of the cancellation of the Geyler company's contract as distributor for the Hudson company. This contract was cancelled June 1. The Chicago firm alleges that it acted as a distributing agent for the manufacturers, rather than as an independent salesman, and is therefore entitled to commissions on the sales of several hundred cars sold for delivery between June 1 and Nov. 30.

TRUCK SALES MANAGERS MEET

CHICAGO, Aug. 22—It was decided at a special meeting of the Board of Directors of the National Association of Motor Truck Sales Managers last week that the first annual conference of the association is to be held at the Hotel Statler, Detroit, Nov. 7 and 8.

MACHINISTS ON STRIKE

AKRON, OHIO, Aug. 25—More than 3000 machinists employed in 26 factories here went on strike this week for an increase of wages and changed working conditions. The demands, which were presented Aug. 1, include \$1 an hour for special tool makers, 64 cents an hour for helpers, a 44-hour week for shift men, and the abolition of all bonus and premium systems.

Greater Production For Olympian Motors

Refinanced, the Company Has
Taken Over the Old Cartercar Plant

PONTIAC, MICH., Aug. 25—The Olympian Motors Co. has just voted a \$300,000 bond issue. The new financing was handled by Chicago brokers, and the issue already has been sold. The Northern Truck Co. of Chicago has been named trustee for the new bond issue.

The new money puts an end to the financial worries of the company and will permit it to get into production on a big sale. The plans contemplate producing 1,000 cars between June and January, and 5,000 cars in 1920.

A mortgage on the company, held by the General Motors Corp., has been paid. The Olympian company occupies the old Cartercar plant formerly owned by the General Motors Corp. This plant is capable of handling the present production, but in order to cope with the greatly increased 1920 production schedule additions may be necessary. The Olympian company has closed for inventory this week.

Fred K. Parke has resigned as president of the company. It is said that a new president will be named within a few days, a Chicago man being mentioned as a possible head of the concern. Vice-President St. Clair Couzens has been made general manager of the company, and L. A. Shadburn of Chicago has been added to the board of directors.

BRITISH PATENT GUARD

WASHINGTON, Aug. 25—To guard the interests of patentees and patent owners, the Imperial Institute of Patentees has been formed in Great Britain by representatives of the National Union of Manufacturers, the Federation of British Industries, the Associated Chambers of Commerce and others interested in patent law. The object of the Institute is to procure extension of the life of those patents held up during the war by controlled firms and to assist patentees who failed to find other support.

ENGINE COMPANY EXPANDS

MADISON, WIS., Aug. 23—The Fuller & Johnson Mfg. Co. will build an addition which will cost about \$125,000.

Reorganization and New Officers for Moore Vehicle

DANVILLE, ILL., Aug. 25—A reorganization of the Moore Motor Vehicle Co., manufacturers of the Moore 30, was announced here to-day by which E. K. Gallagher becomes president, J. H. Vickers vice-president, and John F. Bickle secretary-treasurer. George L. Moore, former president, although retaining his stock in the company, and A. C. Leonard, former vice-president, have resigned.

Year Running High For the Studebaker

President Erskine Predicts Large Profits—Big Production Planned for 1920

SOUTH BEND, IND., Aug. 23.—New earning records, exceeding those of the year 1915 when 27.5 per cent dividends were paid on the outstanding common stock of \$30,000,000, may be made or closely approached this year by the Studebaker Corp. A. R. Erskine, the president, announced to-day that net profits, after deducting fixed charges, were more than double for the first six months of the year than those for the same period in 1918. On this was based his assertion concerning the possibility of a new record for 1919.

"The units of the automobile plants under construction at South Bend will be completed next January," he said. "Shipments of cars will be started in April, with a total of 25,000 scheduled for shipment next year, which, added to 50,000 cars scheduled by the Detroit plants, makes 75,000 cars planned for production next year when, it is estimated, sales will exceed \$100,000,000."

"Since July 1 production and sales show substantial increases and the demand is several times greater than factory output, which, in the case of cars, has been running, and promises to continue, at 4200 cars a month.

"Prices of all automobiles were increased July 1 and the net profits of the third quarter alone, after reserve for income and excess profits are taken out, are estimated at 10 per cent on the common stock. The fourth quarter should give a similar return if production is not interrupted by developments now unexpected.

"The corporation is in stronger financial condition than ever before with cash in bank, sight drafts outstanding and investments in Government and marketable securities of nearly \$15,000,000, with no bank indebtedness and all plant expansion paid for to date. Large inventories of raw materials are on hand at all points and labor and general operating conditions are excellent. The recently adopted co-operative plans for the mutual benefit of employees and stockholders were received with enthusiastic appreciation and give promise of good results throughout the organization."

Erskine, reviewing the season's production, said that output had been in full swing only since April 1 but that, despite this delayed start, the year's profits were expected to reach the estimated high mark.

MILWAUKEE SPEEDS PRODUCTION

MILWAUKEE, WIS., Aug. 23.—Activity in automotive manufacturing here continues to grow by leaps and bounds. There is a little labor trouble, with not more than 8000 or 9000 or 12,000 industrial employees idle on that account. Those who walked out are rapidly going

back to work. The Wisconsin Motor Mfg. Co., manufacturers of passenger car, truck and aviation engines, has been harassed by strikers twice in two months but production has not suffered material interruption. This industry employs from 1400 to 1600 men, of whom 800 to 900 walked out.

The important relation which the gray iron foundry business bears to the automotive industries makes notable the extraordinary expansion now going on in this manufacturing line in Milwaukee. The A. E. Martin Foundry Co., 705 Park Street, which specializes in cylinder and piston casting, is spending \$200,000 to \$250,000 in increasing the shop capacity 100 per cent. The Jaeschke Bros. Foundry Co., 3036 Locust Street, is effecting a 65 to 75 per cent increase at a cost of \$175,000.

Two New Columbia Models Out Soon

DETROIT, Aug. 23.—The Columbia Motors Co. is about to add two new models to its regular line. The new cars are a two-passenger open roadster and a four-passenger coupe. Production on the roadster will start Sept. 1, while the new coupe will be coming through by Sept. 15. The Columbia closed cars for the coming season will be distinguished by the straight line effect and simple treatment of finish.

The Columbia Motors Co. is building a new factory which will permit double production and expects to be established therein soon. The 1920 production schedule calls for the manufacture of 12,000 automobiles.

Exclusive Leasing of Gas Tanks Declared Illegal

WASHINGTON, Aug. 23.—The Federal Trade Commission has taken action to stop the leasing of gasoline pumps and tanks to retail dealers by oil companies on exclusive dealing leasing terms intended to stifle competition. The order to cease this practice has been served on the Standard Oil Company (of Indiana), and prohibits the company from entering into contracts, or from continuing after four months to operate under existing contracts, which provide that dealers, as a consideration for the lease of pumps and tanks, shall only use them for the handling of gasoline and products sold by the Standard Oil Company (of Indiana).

Under the action of the commission the Standard Oil Company (of Indiana) is to report to it fully within 30 days after the four months the nature of the new contracts or arrangements that it makes with dealers.

The leasing of tanks and pumps at rentals below those warrantable to insure reasonable profit, on the condition that they would not be used to distribute the products of competitor companies, the commission found, is an unfair method of competition in violation of law.

Start Production Of Overland Four

Demonstrator Cars Are Going to Distributors—Sales May Start in September

TOLEDO, Aug. 22.—The Willys-Overland Co. will push the sale of the new Overland four with a national advertising campaign which, it is said, will be the largest ever staged by that company. Due to the strike, production on the new model was greatly delayed. Finished machines are now coming through and the company is busy supplying its dealers and distributors with demonstrators. Three of the cars are participating in the transcontinental test trip of the United States Motor Transport Corps, that started at Washington July 7 and is expected to arrive Sept. 2 at San Francisco.

The company has already held one distributors' meeting at which time details regarding the marketing of the new car were taken up. Another such meeting will be held soon, when complete details for the public announcement of the new model will be given out.

Concerning the marketing of the new model, the Willys-Overland Co. has made the following announcement to its distributors:

"By the end of August it is expected that every distributor will have received three Overland four touring cars. One for his showroom, one to be used as a wholesale demonstrator, and one to be used as a retail demonstrator. In addition we expect soon after to supply each distributor with one coupe, one sedan, and a chassis of the Overland four. All of these cars are to be used for demonstration and display purposes only and are not to be delivered to any one until all dealers are supplied with cars and shipment for retail distribution is received.

"By Sept. 15 we expect to supply every dealer with a sample Overland four demonstrator. When all dealers have been supplied with demonstrators the first national announcement of the car will be made.

"A preliminary stock of Overland four parts will be shipped to each distributor so that prior to the arrival of the sample Overland four in his establishment he will be equipped with a parts stock."

CANADIAN PUBLICITY OFFICE

WASHINGTON, Aug. 23.—The Canadian Government is to open a publicity office at New York for the purpose of furthering Canadian interests in the United States. Canada is the second best customer of the United States export trade and will probably draw its fresh supplies of capital from American sources for some time to come. This publicity office will make available to the American public the latest news of all phases of the Dominion's industrial life.

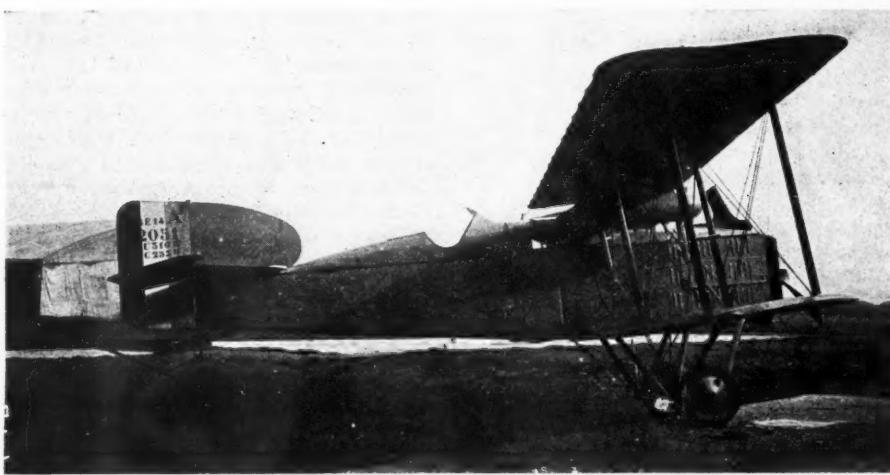
Breguet Type 14 Corps d'Armée Plane

PARIS, July 31—The Breguet Aviation Company has just prepared a machine to be sent to the Argentine as a demonstration model accompanying the French Mission.

Although the passenger carrying installation is special, the design of the machine is fully standardized, for this is type 14 Corps d'Armée plane, fitted with a 300-hp., 12-cylinder Renault engine. During the war more than 8000 of these machines were produced in France.

The plane was made use of first of all for photography and reconnaissance work over the lines. Later it was employed as a day bomber.

The distinctive feature of the machine being sent to the Argentine is the comfortable, well upholstered and well padded three-passenger cabin, which is ahead of the pilot's cockpit. This machine has an average speed of 100 m.p.h. and will carry a useful load of 1100 lb., together with fuel and oil for a flight of 370 miles. Metal construction is used throughout.



Ohio Cities Offer Fair Landing Fields

CLEVELAND, O., Aug. 23—Ten Ohio cities have informed officials of the Cleveland Aviation Club, which is promoting the activities in connection with aviation week here, that facilities have been provided for landing fields in the event of an aerial tour of the state. The cities are Cincinnati, Youngstown, Urbana, Zanesville, Portsmouth, Mansfield, Findlay, Cambridge, Sandusky and Hamilton.

A dozen planes as well as six army balloons are participating in the week's program, which drew an attendance of 12,000 on the opening day. The Cleveland club is composed of about 200 former army fliers.

PARIS-BRUSSELS AIR SERVICE

WASHINGTON, Aug. 25—A daily air service for passengers and merchandise has recently been established between Brussels and Paris. It is expected that postal service between the two cities will soon be added.

The airplane now used is a Bréguet single motor machine, which makes the trip in about 2 hours. A stop is made at Lille for customs inspection. The number of passengers is limited to two, single fare either way being 265 francs (\$51.15 at normal exchange rate or \$35.33 at present exchange rate, \$7.50

francs per dollar). Merchandise is transported at the rate of 1.65 francs per 500 grams (\$0.29 per lb. at normal rate of exchange).

The service is under the control of the Compagnie des Messageries Aériennes (Aerial Transportation Co.), 2 Rue Galilée, Paris, and the Syndicat National pour l'Étude des Transports Aériens (National Syndicate for the Study of Aerial Transportation), 13 Rue Bréderode, Brussels. Belgian capital for the enterprise has been subscribed by a number of the principal banks of the country. A similar service between Brussels and London will be established when the English Government grants permission for civilian machines to make the trip.

The Belgian Government will begin within a few weeks an air service in the Congo from the coast to Stanleyville, in which hydroplanes will be used.

Nine Per Cent of Total Planes In Commission

WASHINGTON, Aug. 23—A total of 9204 planes are reported in the United States by the Air Service, of which 858 or 9 per cent are in commission, 7369 or 80 per cent in reserve and 977 or 11 per cent out of commission. The total does not include the planes already delivered at concentration points for delivery to the Curtiss Aeroplane Corp., but includes all types of planes, foreign and domestic, in storage and at depots.

Caproni Completes Largest Airplane

Accident to Passenger Plane May Hold Up Trials Planned for Present Month

PARIS, Aug. 8 (Special Correspondence)—Overloading and defective construction appear to be the causes of the disaster to the Caproni airplane in which 14 persons lost their lives. When on the return trip from Milan to Venice, the machine dropped from a height of 3000 ft. and every person aboard was killed.

At first, it was thought that the machine took fire in the air, but an examination of the wreckage shows that this supposition is incorrect. It has been found that the floor of the passenger cabin broke under the load carried, allowing the persons to drop through; they did not jump overboard as at first stated. It is generally believed, after close examination, that the machine broke up in the air, although, of course, the initial cause of the breakage is not and probably never will be known.

The Caproni company has just completed the largest airplane ever built. It has a capacity for 100 passengers and is fitted with 5 engines of 350 hp. each. This machine is a triplane.

PLANES CROSS CONTINENTAL DIVIDE

WASHINGTON, Aug. 23—The Transcontinental Recruiting Squadron from Ellington Field flew from Glenwood Springs, Col., to Denver, 130 miles, in 80 min., at an altitude of 16,000 ft., and established a record of being the first ships to go over the continental divide.

\$5,000,000 To Be Spent On British Ford Plant

New Policy Includes Immediate Price Reduction and Exclu- sive Ford Agencies

LONDON, Aug. 9 (Staff Correspondence)—Warren C. Anderson, the Ford company's new organizer of the British business, has just disclosed his policy. It follows the lines indicated in a recent dispatch to AUTOMOTIVE INDUSTRIES.

It embodies three important points: (1) an immediate reduction in price; (2) setting up exclusive Ford agencies, apparently based on the Ford company's American standard, and (3) an expenditure of \$5,000,000 on the extension and remodeling of the present shops at Trafford Park, Manchester. It is contemplated to start production there of 25,000 cars.

These points are covered by the following references: The present British prices of Ford cars are:

Old price	New price
Touring car...£250 (\$1,250)	£220 (\$1,100)
Ford van....£260 (\$1,300)	£210 (\$1,050)
Ford chassis.£200 (\$1,000)	£170 (\$850)
Ford town car, or landauet (not made for some time, but again available)....£300 (\$1,500)	
Ford ton truck chassis....£200 (\$1,000)	

These prices are all quoted free on rail, or delivery at the works, Manchester.

Further, the Ford company is arranging for a series of all-Ford depots in every important center in the Kingdom. A dealer who elects to handle Ford cars in future may not handle any other make of car. He must be an exclusive dealer, and have premises especially fitted up, with a qualified staff of mechanics, salesmen, demonstrators, etc.

Under the new arrangement these Ford service depots will be restricted in their sales of Ford cars, inasmuch as they will only be allowed to sell the cars at the maker's fixed retail prices, to buyers within the district allotted to them. This district will not be restricted to them, as it is quite within the option of the Ford company to appoint one or more authorized dealers in any one important center.

Authorized Ford dealers are called upon to undertake not to alter, or interfere with, or add to the design or working of, any Ford chassis. The company is spending upward of £1,000,000 (five million dollars) on alterations, extensions and improvements to its Trafford Park factory, where it contemplates the manufacture this year of 25,000 cars.

EFFECT OF TRUCKS ON ROADS

WASHINGTON, Aug. 25—To determine the impact and destructive effect of heavily loaded trucks on highways and streets, and to meet the demand for data on the design of road surfaces and

foundations to withstand such heavy traffic, a series of experiments is being conducted by the Bureau of Public Roads, United States Department of Agriculture, at the Arlington Experimental Farm.

Motor trucks now comprise probably 4 to 5 per cent of the total of all motor vehicles, and are to be found wherever traffic conditions permit profitable use. But very few roads were designed to carry any large volume of this class of traffic, consequently the cost of adequate maintenance was greatly increased during the year and in many places complete reconstruction was necessary.

English Small Arms Co. Absorbs Tool Company

LONDON, Aug. 9 (Staff Correspondence)—In addition to bringing about a fusion of interests with the Jessop Steel Co. of Sheffield at a cost of £1,400,000 (\$7,000,000) in cash and shares, the Birmingham Small Arms Co. has bought the business of Burton Griffith & Co., Ludgate Circus, London, E. C., dealers in and importers of American small tools and machinery.

The B. S. A. Co. already has a preponderating interest in the Daimler Co., Coventry, whose output of vehicles is capable of being worked up to 20,000 a year.

The B. S. A. Co. also has a tools branch, which the absorption of the Burton Griffith Co. should materially strengthen.

CHANDLER EARNED \$2,800,000

CLEVELAND, Aug. 25—Net earnings of the Chandler Motor Car Co. for the first seven months of 1919 were about \$2,800,000, or \$40 a share on the 70,000 shares of stock, before providing for taxes.

Up to Aug. 1 the company produced more than 9000 cars, more than the entire year of 1918. It plans production of 25,000 cars for 1920.

PARCEL POST WITH SPAIN

WASHINGTON, Aug. 25—A parcel post convention has been negotiated successfully with Spain by the United States Post Office, and the exchange of parcel post will begin Sept. 1, pending final ratification of the new treaty. This treaty includes parcel post service to the Balearic Islands and the Canary Islands as well as the Spanish possessions in northern Africa.

GERMAN AERIAL LINE

NEW YORK, Aug. 23—Reports received here are to the effect that the old Hamburg-American Line, the German shipping corporation, has entered the aerial passenger and freight business. A regular service has been inaugurated from Berlin to Swiss resorts, the company having taken the name of the German Aerial Navigation Corp.

Austin Outlines

Post-War Program

LONDON, Aug. 7 (Staff Correspondence)—At the stockholders' meeting of the Austin Motors Co., Ltd., Sir Herbert Austin, chairman of the company, told of its services during the war, and then turned to the business prospects.

He said that the new 20 hp. car and the agricultural tractor were going into production in fairly satisfactory quantities.

Concerning the future of the tractor, he said:

"The demand for the tractor in France, following the successful demonstrations of its utility, has been so great that a French company is being formed to manufacture the machine at Liancourt, near Griel, where a suitable factory has been purchased. A small company, called The Austin Motor Société Anonyme, is also being formed in Belgium to handle Austin products. A number of motor trucks already have been sold in that country and contracts for cars and tractors have been obtained."

The money recently obtained from the sale of new shares has been used to purchase from the Government two factories that had been constructed for war work.

58 Tractors of 19

Makes In English Trial

LONDON, Aug. 8 (Staff Correspondence)—Fifty-eight tractors are now listed by thirty-two entrants to take part in the tractor trials to be held Sept. 24 to 27 under the auspices of the Society of Motor Manufacturers and Traders, Ltd., at Carlton, near Lincoln.

The following nineteen entries are for one tractor each: Avery, Clayton, Crawley, Emerson, Fiat, Glasgow, Gray, G. O. Illinois, Mann (steam), Maskell, Moline, Omnidractor, Overtime, Pick, Santler, Summerscales (steam), Weeks-Simplex and the Eros-Ford attachment.

Following entries are for more than one competitor, the number of each entry being denoted: International Harvester Co., seven including the new vertical four; Alldays General Purpose, Austin, Blackstone, Burford, Fordson, Samson, Saunderson, and Wallis-Cub, three each; Martin, Garner, Case and Whiting-Bull, two each.

TRADE WITH JAVA

WASHINGTON, Aug. 22—For the development of trade between Java and the United States it is of the utmost importance that experienced representatives of American firms should be sent there to remain long enough to learn the Dutch language and study conditions sufficiently to be able to adapt present American commercial methods to local needs, is the sentiment expressed by prominent business houses in the Island, according to a Department of Commerce report.

Provincial Club Races May Force Grand Prix

PARIS, Aug. 15 (*Staff Correspondence*)—It is not yet known whether there will be a French Grand Prix automobile race next year. The decision rests with the Sporting Commission of the Automobile Club of France which, at the present time, appears to be trying to make up its mind.

The Automobile Club of the Sarthe, which has its headquarters in the town of Le Mans, is not under any hesitation, for it has already announced to the French National Club that next year it will hold the speed contest it had organized for August, 1914; but which was never run owing to the war. The effect of this announcement probably will be to force the hands of the Sporting Commission. If a provincial club can organize a successful race there is no reason why the National Club should not hold its Grand Prix.

The 1914 program of the Sarthe Club comprised races for motorcycles, cycle-cars, light cars and 183 cu. in. racing cars. Just before the war clouds burst there had been received for these races a total of 137 entries. It is proposed to carry out next year the program laid down for 1914.

WESTINGHOUSE INDIANAPOLIS OFFICE

NEW YORK, Aug. 25—The Westinghouse Electric & Mfg. Co. has reopened its Indianapolis office for the automotive equipment department, which was closed during the war. It is at 1003 City Trust Building in charge of Knox Easterling.

INSTITUTE OF METALS MEETING

SHEFFIELD, ENG., Aug. 25—The first gathering of the Institute of Metals to be held out of London since 1913 will take place here on Sept. 24 and 25. A program, including inspection of the university here as well as visits to steel, silver and cutlery firms has been arranged.

REFUND ON REDUCED TAXES

WASHINGTON, Aug. 25—When shippers have paid taxes which have been collected by carriers based on rates later declared excessive and ordered reduced by the Interstate Commerce Commission, they are entitled to a refund. Reparation payments may be made by the carrier and in event the taxes have already been paid to the Treasury, the carrier may make reparation by refund and take credit for the same against amounts included in subsequent monthly returns.

TAXES RETURNED TO AGENCIES

ST. LOUIS, Aug. 25—Automobile sales agencies and branch agencies separately incorporated from the manufacturer's corporation for which they distribute are placed on a parity for return of excise taxes with dealers who have no connection with the factory organization, ac-

cording to Treasury Decision 2909 furnished to the National Automobile Dealers' Association.

Previously the revenue department has held that a sale by such an agency was a sale by the manufacturer, and as such the tax was that due on the price actually paid by the customer for the car, instead of the price for which the manufacturer sold it to a dealer not connected with the manufacturer's corporation. As a consequence, a branch house tax made the total price of the car higher than the dealer's price, or else reduced the branch house profit to less than the dealer's profits on the same car.

Reduce Estimate on British Cars

LONDON, Aug. 10 (*Special Correspondence*)—There recently has been printed in America an item that the total number of cars in England at present is 411,791, this figure being arrived at by adding together the total issue of the various petrol licenses. There is a serious error here, however, because England has five series of licenses and many people have one of each series, so that on the basis of the reckoning above referred to, they would have figured in the total as having five cars instead of one.

It must also be remembered that those licenses were given on a diminishing scale as the situation became more rigorous, and were finally supplied only to doctors and others who could prove necessity.

Actually there is great difficulty in this country in estimating the total number of cars running because registrations are for the lifetime of a car and not for one year. In other words, when a car goes into use, it is given a number plate which it is supposed to continue through the life of the vehicle, and then if the vehicle changes hands, the new owner may take over the existing plates by payment of a fee or have his own new plates put on. Here again is another complication.

It is considered, however, that there are not more than 180,000 cars here and about 200,000 motorcycles.

NATIONAL LICENSE FOR FLYERS

WASHINGTON, Aug. 20—Civilian flyers must no longer apply for flying permits to the Joint Army and Navy Board of Aeronautic Cognizance. The President has revoked his proclamation making it necessary for civilian flyers to apply for flying permits.

The International Air Regulations, which were published in these columns several months past, deal with the issuance of flying licenses and, as legislation is now pending in Congress in connection with these, the Joint Board does not believe that it is necessary or practical for municipalities or states to issue flying licenses until a national standard license is authorized.

Duesenberg Swept The Race at Elgin

Milton, In Winning, Failed to Set a New Record—Few Cars Finished

THE FINISH AT ELGIN		
Position	Car and Driver	Corrected Time M.P.H.
1	Duesenberg, Milton	4:05:27 73.9
2	Roamer, Sarles	4:30:97 67.08
3	Mercer, Schillo	4:41:38 64.35
4	Philbrin, Vail	4:45:20 63.98
5	Roamer, Hitke	Flagged
6	Peugeot, Harvey	Flagged
7	Oldfield, Stein	Flagged

ELGIN, ILL., Aug. 23—Lack of fast competition in the latter half of to-day's race prevented the establishment of a new record for the Elgin course. Milton in an eight-cylinder Duesenberg won with an average speed of 73.9 m.p.h. for the 302 miles, finishing 25 minutes ahead of Sarles in a Roamer Special.

The first half of the race was very fast and resulted in many eliminations so that the speed was perceptibly slowed up in the latter half. Mulford's eight-cylinder Duesenberg, Klein's Peugeot and Alley's Bender Special put up a real battle during the first half which Mulford completed at the rate of 78.4 m.p.h., 1.15 m.p.h. faster than the record of the winning Stutz in 1915. All three of these early leaders were put out by engine trouble before the race was three-quarters completed.

Mulford was forced to the pits at the end of the twenty-second lap. The lead then passed to Klein, who held it until the thirty-first lap, when a burned out bearing put the four-year-old Peugeot out of the running. Milton, who had been pressing Klein hard for the last eight laps, assumed the lead and maintained it until the finish. From that point, it was an easy race for Milton as he had no serious rival, the remaining cars fighting merely for the minor positions.

To-day's race was a triumph for Duesenberg engines, as three of the first four cars to place were powered with this make of engine. The race also demonstrated that 300 cu. in. engines are too fast for the course, as the faster cars could not stand up under the punishment they received at high speed. Undoubtedly next year's race will be run with 183 cu. in. engines and should be more satisfactory than was the running to-day.

MOTOR EXPRESS EXHIBIT

NEW YORK, Aug. 25—The Rural Motor Express idea is to be given publicity by the state of New York at the state fair at Syracuse the week of Sept. 8. A rural motor express exhibit will be included in the display of the Bureau of Farms and Markets.

Manager F. W. Fenn of the Motor Truck Committee of the N. A. C. C. is promoting truck tours from Buffalo and Rochester to the state fair.

Governor Smith has appointed a new highway transport committee, of which Fenn is a member.

British Labor Votes Against Piece Rate

Favor Premium Bonus System— Apprenticeship Plan Is Revived

LONDON, Aug. 5—(Special Correspondence).—The Amalgamated Society of Engineers, the premier trade union of British mechanics, with a capital of about \$5,000,000 and a membership by far the largest of any British trade union, has taken a decisive vote of the membership, the effect of which will be to abolish piecework and to restrict apprentices to one for each three adult members. This decision against piecework may denote a return to the day or hour rate of pay without reference to output. This differentiates between various forms of premium bonus systems.

The piece-rate system always has been looked at askance by British unions of skilled mechanics, largely because of the bad experience with it in the earlier days of its introduction. Besides, it often happened that piece prices were set at random, and, as soon as it was seen that the workers benefited by their increased efforts the rates were cut so as to limit the gross earnings to something like the original day rate. Moreover, it was found that stimulated production was frequently followed by long spells without work, so that there was no economic benefit in the end and often men suffered in health from their efforts in workshops of the sort then prevalent.

Bonus Systems Always Approved

Premium bonus systems on the other hand have always been more favored because they are not dependent on the wage rate, which continues fixed as a ruling factor, but are in the nature of a bonus or reward at a certain rate for so much production above the normal represented by the weekly wage. Possibly the engineers will continue to work

under this sort of encouraging system, as opposed to one that practically resolves itself into payment by results.

How the British motor manufacturing industry, among a number of modern trades, will fare if the issue is confined to the narrowest limits is a sore problem. At worst it will mean that either output will be limited to the expensive chassis which will stand the cost, or alternately, it will hasten mass production on Ford lines by unskilled and necessarily non-union labor. Even in this event there will be difficulty with the tool and jig makers, who now compose a large and increasingly organized body, with a trade union of its own, and many members belonging jointly to it and the A. S. E.

Revival of Apprentices

The decision to restrict the number of apprentices is interesting on two counts: It recalls a similar effort of the A. S. E. that led to a strike of many months duration some thirty years ago and it marks the revival of apprenticeship in the British engineering trades.

Until recently apprenticeship had practically ceased in British engine shops; the lads being mostly junior workers engaged at an hour or weekly rate of pay. The war and recent national education legislation—which has raised the leaving age from school to 14 years, and has established continuation schools with compulsory attendance at them up to 18 years—have brought about a practical revival of apprenticeship.

Numerous motor works now have special schools for boys. To obtain the benefit of this workshop schooling, it is obligatory for the boys to be apprenticed and so it has come about almost automatically that apprenticeship is again established. In some works these boys are taken either as apprentices entitled to this schooling and pledged to remain with the firm, or they continue to serve as wage lads without ties and open to dismissal, according to the state of trade.

Engineer Attempts Standards Reform

NEW YORK, Aug. 26—An attempt to co-ordinate the standardization specification work of various American engineering associations has been under way here for several days through efforts by C. le Maistre, secretary of the British Engineering Standards Association. Through recent work of a mechanical nature carried on by this country and Great Britain, it has been found that these specifications are promulgated in this country by a number of bodies, and le Maistre came here from London in an endeavor to work with American societies, including those of the automotive industry, to co-ordinate such work.

He left here last night for Ottawa, Canada, on a similar task with Canadian associations, but will return to New York early in September. Le Maistre also is secretary of the Interallied Aircraft Standards Commission, the formation of which was completed by the larger Allied countries shortly before the armistice. This work, however, has been continued and a part of his time in this country will be devoted to the work of this body.

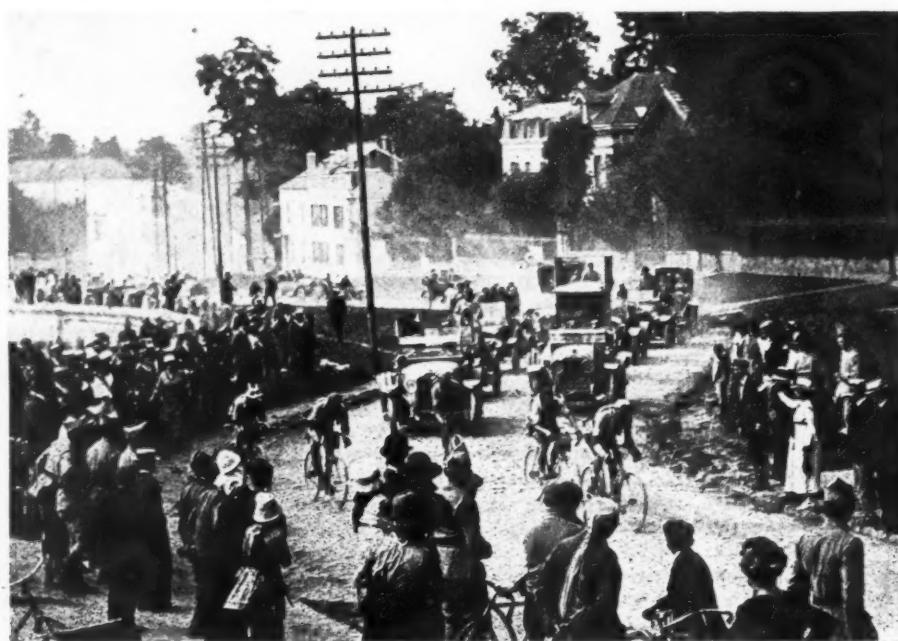
G. M. C. OFFICIALS TO EUROPE

NEW YORK, Aug. 25—Officials of the General Motors Corp. sailed from here last week for Europe, where the party will spend two months in England, France, Italy and Belgium studying conditions there in the manufacture and sale of cars.

They were accompanied by Albert Champion, president of the Champion Ignition Co., and Charles F. Kettering, president of the Dayton Engineering Laboratories Co. The General Motors officials, all vice-presidents, are J. A. Haskell, W. P. Chrysler, A. P. Sloan and C. S. Mott.



**The End
of the
3454-Mile
Bicycle Race
Around
France**



*The riders cov-
ered this distance
in fifteen days
and the winner
averaged 15
m.p.h. Numerous
cars followed the
cyclists*



Radiator and Axle

Companies Form Merger

DETROIT, Aug. 23—The McCord Mfg. Co. and the Russel Motor Axle Co. have merged into a new company. Stockholders of the Russel company will receive \$50 a share in cash, \$77.66 in 7 per cent preferred stock and one-half a share in McCord Manufacturing common stock in exchange for the transfer of \$750,000 of capital stock to McCord control.

The Russel Motor Axle Co. manufactures internal drive gears and axles for motor cars and trucks, while the McCord company produces automobile radiators. The former has a large plant in Detroit and the latter has plants in Detroit and Chicago.

The Russel company was organized in December, 1909, and on Oct. 31, 1918, had assets of \$1,304,353, of which \$455,826 was in the plant. Assets of the McCord company are \$3,865,154. It was organized in 1908.

Proposes Purchase of Aerial Fields

WASHINGTON, Aug. 23—The purchase of a number of aviation fields in the United States would be authorized by a bill introduced in the Senate by Senator Wadsworth, appropriating the necessary funds and designating the various fields. Included are March Field, Riverside County, Cal., at \$64,000; Mather Field, Sacramento, Cal., \$78,673; Ross Field, Los Angeles County, Cal., \$55,654; Ellington Field, Harris County, Tex., \$40,651; Kelly Field No. 2, Bexar County, Tex., \$349,686; Brook Field, Bexar County, Tex., \$140,445; Park Field, Shelby County, Tenn., \$88,010; Selfridge Field, Macomb County, Mich., \$190,000; Chanute Field, Champagne County, Ill., \$208,000; Chapman Field, Dade County, Fla., \$71,500; Montgomery County Field, Ala., \$34,237.

The bill would authorize the Secretary of War to spend unexpended balances of air appropriations for the following real estate: Fifty acres near Middletown,

Pa., for an aviation general supply depot; fifty-five acres near Little Rock, Ark., for a general supply depot, and a number of small parcels of land located near other fields to be used as rights of way, etc.

Appropriation is also made of \$470,000 for the purchase of Ream Field, San Diego County, Cal., for use as an adjunct to Rockwell Field and \$1,250,000 for the continuation of permanent construction at Rockwell Field and \$950,000 for the continuation of construction at Langley Field, Hampton, Va.

A similar bill has been introduced by Senator Sheppard for the purchase of a part of Ellington Field and Kelly Field.

Extensive Use for Truck Foreseen in Sao Paulo

WASHINGTON, Aug. 23—(Staff Correspondence)—Sao Paulo, Brazil, will resume extensive use of motor trucks, according to a report from Consul Hoover. With the outbreak of the war, the importation of trucks into Sao Paulo was practically discontinued, due to the high prices of gasoline and accessories, such as tires, etc., making animal traction more economical, but with the reduction in prices old passenger cars have been converted into trucks, which indicate that the use of trucks is increasing.

Truck service is proposed between Sao Paulo and Santos, the most important port in this vicinity, and the one through which most of the merchandise destined for Sao Paulo passes, but because of the steep grades between the two cities this scheme would not be practical unless trucks of unusual driving power were obtained.

GOVERNMENT SELLS SURPLUS BRASS

WASHINGTON, Aug. 23—The Director of Sales announces that the War Department is preparing to offer for sale, under sealed bids, its surplus of brass, totaling approximately 192,347,057 lb. The material includes anvil brass, brass rods, brass bars, brass billets, cast bars.

Less Than \$2,000,000,000

WASHINGTON, Aug. 22—Suspended War Department contracts awaiting liquidation amount to \$1,987,591,000. Suspended contracts amounting to \$1,763,845,000 or 47 per cent have been liquidated to date. It is estimated that by liquidation 86.1 per cent of the value of

Contracts To Be Liquidated

the outstanding contracts has been saved. Following is the status of appropriations of the various Army divisions showing the amounts of the total appropriations available, withdrawal from the Treasury, and the balance remaining to the credit of each division or corps:

	Appropriations	Withdrawals From Treasury	Balances
Air Service	\$29,595,000	\$552,000	\$29,043,000
Chemical Warfare	129,756,000	87,811,000	41,945,000
Engineer Corps	530,725,000	389,691,000	141,034,000
Medical Department	237,340,000	181,445,000	55,895,000
Ordnance Department	3,803,293,000	2,452,966,000	1,350,327,000
Signal Corps	77,370,000	45,515,000	31,855,000
Quartermaster Corps	6,806,329,000	4,539,914,000	2,266,415,000
Total	\$11,614,408,000	\$7,697,894,000	\$3,916,514,000

Per Cent of Appropriations Withdrawn		
Medical Department	76	59
Engineer Corps	73	2
Chemical Warfare	68	66
Quartermaster Corps	67	
Ordnance Department	64	

*Current appropriations only.

Timken-Detroit Axle Runs Company Store

Factory Representation in Management—Bonus System Based on Length of Service

DETROIT, Aug. 25 (Staff Correspondence)—The Timken-Detroit Axle Co. has established a company store, operating on the co-operative plan, in which 1000 employees are shareholders and are receiving their groceries at cost plus a slight profit to cover operation.

The store started with 500 members. It now has double that number.

The company furnishes the building, heat, light and a delivery service every Saturday. The manager's salary and other running expenses are paid out of the store receipts. The patrons are buying at a saving of from 10 to 15 per cent.

Coupon books for \$5 and \$10 are issued, this amount being taken out of the pay envelopes.

Strike in Spite of Co-operative Plan

Four months ago the machinists' union called a strike at the Timken plant. Just prior to that time the company had inaugurated a plan giving the workingman participation in the actual management of factory affairs. The plan was a modification of the workingman's congress idea and it scarcely had been put in effect when the strike forced its abandonment. The plan consisted of a house of representatives to be chosen by the men to deal with matters of interest to the employees. The plan did not include a senate composed of foremen, but in other respects followed the general plan now in operation in other cities. Company officials do not deem the plan a failure because the union demanded that the plant be turned into a closed shop.

Service Bonus Money

Service bonus money is one of the unique ideas of the company to eliminate labor turnover.

Within 30 days from the calling of the strike 60 per cent of the strikers were back at work and the vacant positions had been filled by new employees. Although the union is still holding fast and hundreds of old employees are still out, and although the plant has been continuously picketed by the union, the company is operating with a full working force and has again reached maximum production.

The service bonus money plan is based upon the employee's service with the company. Those who remain six months receive an additional 1½ per cent. The percentage then mounts from 2 per cent for one year to 10 per cent for five years and upwards. An attendance bonus of 3 per cent is also paid to employees who are on time morning and noon. This sum is disbursed monthly.

Last September the Timken-Detroit Axle Co. granted employees an eight-hour day without solicitation. The current wage is above \$5.

Industrial Minister**Interested in Citroen**

PARIS, Aug. 7—According to a report circulated here, M. Loucheur, Minister of Industrial Reconstruction, has invested \$4,000,000 in the Citroen Automobile Co. M. Loucheur during the war was Minister of Armament. This financial change is not confirmed by the Citroen Company.

The local strike having come to a close, Citroen is now getting into production and promises to deliver 50 cars per day during the month of September.

John M. Pendleton has been appointed distributor for the Bessemer Motor Truck Co., Grove City, Pa., in New York State as far north as Schenectady; in New Jersey, north of Trenton; and in the entire states of Rhode Island and Massachusetts. He has opened headquarters under the name of the Bessemer Agency of New York, at 505 West Fifty-fifth Street, New York City, where a sales and service station and garage are maintained.

E. Stanley Clark, who has been with the Eisemann Magneto Corp. for the past two years, has been made advertising manager of the concern, with headquarters at the Eisemann plant, Brooklyn, N. Y.

H. B. Schmidt has resigned as one of the directors, vice-president and purchasing agent for the Crow-Elkhart Motor Corp. to become connected with the Huffman Bros. Motor Co., Elkhart, Ind., as manager for the company's passenger car department.

F. N. Weber has been appointed assistant purchasing agent for the Mitchell Motors Co., Racine, Wis. He will take charge of purchases of all materials entering directly into the construction of bodies and some of the materials for the construction of chassis. His appointment to this position follows his release from government service, where he was connected with motor truck production.

Robert L. Murphy has been appointed purchasing agent of the Wisconsin Parts Co., Oshkosh, Wis., to succeed L. W. Cash, who resigned recently.

H. C. Buffington will leave the Minneapolis Steel & Machinery Co. on Sept. 1 to become chief engineer of the Holt Manufacturing Co., Peoria, Ill.

H. F. Harris has been appointed general manager of the Bethlehem Motors Corp., Allentown, Pa. Mr. Harris is an industrial engineer who has had experience with the Everett, Studebaker, Maxwell and Overland organizations, and for the past two years has been with the Republic Motor Truck Co.

Charles W. McKay has taken charge of the appraisal division of L. V. Estes, Inc., Chicago, industrial engineers.

G. E. Carpenter has been appointed purchasing agent of the Lincoln Motor Co., Detroit.

Paul M. Fifer succeeds Paul Cornelius in the production department of the Oakes Co., Indianapolis, Ind.

Men of the Industry

Changes in Personnel and Position

DECORATE ENGLISH MAKER

BIRMINGHAM, ENGLAND, Aug. 7—*(Special correspondence)*—The title of Commander de l'Ordre de Leopold II has been conferred, by the King of Belgium, upon Sir Herbert Austin, managing director of the Austin Motor Co. The citation stated that the decoration was in recognition of "constant and generous help given to this country in the course of the war."

HOLDEN STUDYING FOREIGN CONDITIONS

C. S. Holden, of The Cleveland Welding & Manufacturing Co., recently sailed for England, France and other foreign countries, to study market conditions in relation to the products of the company.

H. L. McLaren, who recently resigned as president and general manager of the Ajax and Racine rubber companies, has become president and active general manager of the J. & D. Tire Co., Charlotte, N. C. Mr. McLaren was elected president and general manager of the Racine Rubber Co. in 1913, and when that company was merged with the Ajax Rubber Co. in 1917 he held the same position with both companies. In his new position he succeeds William F. Smith, who has resigned.

Frederick C. Gilbert, vice-president and director of the Timken-Detroit Axle Co. in charge of sales and publicity, who has been with the organization since its formation ten years ago, has resigned. Prior to this connection he was for 14 years with the Pope Manufacturing Co., as general production manager for several of its plants, including the Pope Motor Car Co., Toledo, later sold to the Willys-Overland interests. Mr. Gilbert plans to take a rest before making any announcement of future plans.

NORTHERN WHEEL ORGANIZED

ALMA, MICH., Aug. 23—The Northern Wheel Co. to be incorporated under the laws of Delaware with a capital stock of \$1,000,000, is being organized here by A. B. Smith of St. Johns, formerly of the Hayes Wheel Co. Ground has been purchased for a factory site.

The company will make wooden wheels for both commercial and passenger cars and later will install a pressed steel foundry and make steel wheels. The factory proper will be 304 by 60 ft., one story high, with a separate heating plant. Work on the building is to be completed by Dec. 1. The company plans to start operations with 125 men.

FULTON FACTORY BRANCH

BOSTON, Aug. 23—As a result of the convention of the Fulton Motor Truck officials and dealers at New York this week it was decided to make the distribution in New England a factory branch instead of having the trucks distributed through C. S. Ransom, Inc.

A. H. McIntyre, who was New England district manager, and Percy Ford, sales manager for C. S. Ransom, will direct the affairs of the branch. They have taken over the sales and service quarters of Mr. Ransom at 704 Beacon Street and will continue the business there.

JACKSON MANAGERS ORGANIZE

JACKSON, MICH., Aug. 21—Jackson employers have organized an employment managers' club. The purpose of this club is to keep in close touch with the wage standards, working systems, athletics, welfare and personal work, and all questions of modern shop management as it pertains to the workingmen. C. A. Nutting of the Briscoe Motor Co. was chosen as president. Other officers are: Vice-president, Frank Kearney of the Sparks-Withington Co.; secretary, Fred M. Thompson of the Employers' Association; treasurer, H. D. Fisher of the Hayes Wheel Co.

OFFICERS OF WISCONSIN PARTS

OSHKOSH, WIS., Aug. 23—Officers elected for the reorganized Wisconsin Parts Co., formerly the E. B. Hayes Machinery Co., are: President, W. F. Rockwell, until recently vice-president in charge of engineering and construction of the Torbensen Axle Co.; vice-president, J. F. Hayes, formerly president of the Hayes Co.; treasurer, Louis Schriber, vice-president of the Old National Bank of Oshkosh and a director of the First National Bank of Milwaukee; secretary, E. J. Dempsey; assistant secretary, E. H. Rhyner; assistant treasurer, A. H. Chatley. Officers, with E. M. Morris and Harry Wall, form the new board of directors.

STEEL CO. MAKING PARTS

SHARON, PA., Aug. 23—Work at the Wheatland plant of the Slick-Knox Steel Co. has reached a point where deliveries will be made in a few weeks. The Wheatland plant now is manufacturing automobile gear ring blank flanges, draft gears, patent springs and automobile frames, in addition to railroad and blast furnace equipment.

The Ellwood plant of the corporation, it is announced, will continue production of its Atlas trucks. This plant will also make automobile lockers and sheet metal for buildings.

The officers of the company, recently elected, are: E. E. Slick, chairman; L. L. Knox, president; C. K. Strasbaugh, vice-president; William McIntyre, second vice-president; A. R. McGill, secretary and treasurer, and Park Bachman, Edwin Hodge, Jr., Mont Murray, James Scott, W. H. Schoen and George Short directors.

NEW FORD PARTS PLANT

MOUNT CLEMENS, MICH., Aug. 21—A \$500,000 factory will be built here by Henry Ford for the manufacture of automobile and tractor parts. It will get its power from the Clinton River. The Ford engineers are now at work locating a suitable site. A concrete dam, 125 ft. in length, will be built. When complete the new plant will employ between 300 and 400 men. The Ford company will also build a large number of homes for its workers.

TELEPHONE CO. BRINGS SUIT

CHICAGO, Aug. 23—Suit for the infringement of its Wilcox and Cavanagh patent No. 1204104 has been brought by the Connecticut Telephone & Electric Co. in the United States District Court here against Joseph Weidenhoff. This is the second case brought for the manufacture of spurious parts for the company's ignition system. The first one, against Paul G. Niehoff last December, was settled amicably when the company agreed to discontinue the practice.

NEW NAME FOR REAMER CO.

DETROIT, Aug. 23—The Grinding Process Tool Co. is the new name for the Detroit Reamer Salvage Co. The company will re-manufacture machine tools of all characters. The capital stock has been increased.

POWRLOK CANADIAN BRANCH

CLEVELAND, Aug. 22—The Powrlok Co. has completed arrangements for a Canadian branch at Walkerville, Ont. It will combine a sales office and assembling plant under the supervision of D. C. Nale.

PACKARD ERECTS TWO BUILDINGS

DETROIT, Aug. 23—The Packard Motor Car Co. will erect two buildings to house its service department and its local salesroom. The service building will be L-shaped with a street frontage of 400 ft. It will be 80 ft. deep, four stories high and have a total floor area of 100,000 sq. ft. The salesroom will be started after the completion of the service room.

G. M. C. SAVINGS PLAN SPREADS

BRISTOL, CONN., Aug. 22—The General Motors Corp. savings plan has been offered to the employees of the New Departure Manufacturing Co., a subsidiary of the G. M. C.

G. M. C. TRUCK ADDITION

PONTIAC, Aug. 25—The General Motors Corp. will build a \$100,000 warehouse and add additional office space at the General Motors Truck Co. plant here. The warehouse is to be 80 by 300 ft. Office rooms will be secured by adding a second story to the present structure. This will provide 8000 sq. ft. more floor space and it will be used by the sales and engineering departments.

Current News of Factories

Notes of New Plants—
Old Ones Enlarged

CANADIAN HANDLEY-PAGE

OTTAWA, Aug. 23—A Canadian charter, authorizing a capitalization of \$2,500,000 has been issued to Handley-Page, Ltd., for the manufacture and sale of airplanes. The company offices are to be at Morrisburg, Ont.

SEAMLESS TUBES BUILDS

DETROIT, MICH., Aug. 25—The Detroit Seamless Steel Tubes Co. has begun construction here of a \$3,000,000 plant on a 60-acre tract of land. The first unit will cost \$1,000,000 and will be completed by Jan. 1, 1920. The plant proper will occupy a space of 350 x 700 ft. It will consist of three bays for manufacturing units, a separate heating plant and a two-story administration building. The three manufacturing units will be each 90 ft. wide by 700 and 550 ft. long and 45 ft. high. The interior layout and special tube mill machinery were designed under the direction of C. A. Ross, consulting mechanical engineer, and C. I. Stafford, mill superintendent.

The total capacity of the first unit will be 2500 tons of seamless steel tubing a month, the range of sizes being from one-half inch to six inches outside diameter, and No. 13 gauge and heavier. Cold drawn seamless steel boiler tubes and locomotive flues will be manufactured as well as mechanical tubing, used in the manufacturing of automobiles, tractors and trucks.

PLANT CHANGES HANDS

DETROIT, Aug. 23—The Detroit Pressed Steel Co. is planning to take immediate possession of the Carlton Avenue plant of the Detroit Shell Co., which it has acquired as an addition to its Mt. Elliot Avenue factory. The building was built four years ago for the Springfield Body Co. and was used during the war for shell casings.

ELDRIDGE CORP. FORMED

BUFFALO, N. Y., Aug. 23—Articles of incorporation have been issued for the Eldridge Automotive Corp., with a capitalization of \$500,000. The incorporators are Francis C. Owen, J. E. McComber and D. H. McCarriagher, with offices in the Erie County Bank Building.

AUTOCAR REDEEMS BONDS

ARDMORE, PA., Aug. 25—All its 5 per cent first mortgage serial bonds outstanding will be redeemed by the Autocar Co. on Oct. 1, at 102½ and interest.

Garford Puts Out

New Light Model

LIMA, OHIO, Aug. 23—A new model, known as 25, of 1 ¼ ton capacity, has been added to the truck line of the Garford Motor Truck Co. Announcements of its specifications were made here today.

The new truck has a sales price of \$1,890 and is built with frame and axles of the strength of a heavier capacity than its designation. The engine is 22 hp., four cylinders of the dimensions 3 ¾ x 5 ½ in. The tires are solids, the fronts being 36 x 3 ½ and the rear 36 x 4. Electric lighting and starting equipment is \$125 extra.

AJAX STOCK AUTHORIZED

NEW YORK, Aug. 23—The issuance of 36,000 shares of treasury stock of the Ajax Rubber Co. has been authorized by the directors of that company. It will be offered to stockholders at \$70 a share. Proceeds, it was announced, will be used for enlargements and extensions of the Ajax business. Further announcement was made that Averill Tilden, of Chicago, had been named a director in the company.

STEWART-WARNER PROFITS
LARGE

CHICAGO, Aug. 23—Profits equivalent to \$12.37 a share on \$10,000,000 of common stock were announced for the first six months of 1919 by the Stewart-Warner Speedometer Corp. This compares with \$9.44 a share in the same period of last year. The statement, as of June 30, showed a net profit of \$1,236,884, after the deduction of cost, selling and other expenses, provisions for discounts, losses and depreciation, and provision of \$137,000 for Federal taxes. The income account was compared as follows:

	1919	1918
Net, after all charges and taxes	\$1,236,884	\$944,310
Dividends	400,000	300,000
Surplus	\$836,884	\$544,310
Previous surplus	6,450,880	5,906,570
Total surplus	\$7,287,764	\$6,450,880

KELLOGG INCREASES CAPITAL

ROCHESTER, N. Y., Aug. 22—The Kellogg Manufacturing Co. has increased its capital from \$75,000 to \$300,000 to provide for its increasing business.

STROMBERG EARNINGS

CHICAGO, Aug. 25—The general profit and loss statement of the Stromberg Carburetor Co. of America, for three months ended June 30, 1919, shows earnings of \$201,010 and other income of \$2,282, making the total income \$203,293. After deductions of \$54,539 expense, \$25,000 reserve for federal taxes, and dividends of \$50,000 were made, a surplus of \$73,754 remained, which is \$62,052 more than the \$11,702 surplus for the preceding quarter. Profit and loss surplus on June 30 amounted to \$1,243,056.

Calendar

SHOWS

Sept. 13-20—Cincinnati, O. Ninth Annual, Music Hall. Cincinnati Automobile Dealers' Assn., H. K. Shockley, Manager.

Sept. 15-20—Springfield, Mass. Eastern States Exposition.

Sept. 24-Oct. 4—New York, N.Y. New York Electrical Show, Grand Central Palace.

October—Ft. Dodge, Ia. Fall Motor Show, District Fair Grounds.

Oct. 6-11—Detroit, Mich. Closed Car Show, Arena Gardens. Detroit Auto Dealers' Assn., H. H. Shuart, Mgr.

Oct. 11-18—Pittsburgh, Pa. Fall Show.

Oct. 15—New York City. Opening of International Farm Tractor and Implement Exchange, Grand Central Palace.

Nov. 3-8—Chicago, Ill. Business Exhibit of Automotive equipment Assn., Medina Temple.

Nov. 16-23—New York Automobile Salon, Hotel Commodore.

January—New York. International Automobile Mfrs. Congress.

Jan. 3-10—New York, N. Y. Grand Central Palace, National Automobile Chamber of Commerce, S. A. Miles, Manager.

Jan. 3-10—New York City. Eighth Coast Artillery Armory, commercial cars and accessories.

Jan. 24-31—Chicago, Ill. Coliseum, Cars; Drexel Pavilion, Trucks; National Automobile Chamber of Commerce. S. A. Miles, Manager.

Jan. 24-31—Chicago. International Amphitheater, commercial cars and accessories.

February—Chicago. International Automobile Mfrs. Congress.

February—Deadwood, S. D. Annual show, Deadwood Business Club, F. R. Baldwin, Manager.

FOREIGN SHOWS

Aug. 23-Oct. 6—Toronto, Can. Cars, Trucks and Tractors, Airplanes and Motor Boats in conjunction with Canadian National Exhibition.

Sept. 6-16—Ottawa, Ont. Central Canada Exhibition.

Sept. 24-27—London, Eng. Commercial Vehicles Exhibition, Olympia Society of Motor Mfrs. & Traders, Ltd.

Sept. 24-27—Lincoln, Eng. Tractor trial. Society of Motor Manufacturers and Traders, Ltd.

Sept. 24-27—Lincoln, Eng. Exhibition of tractors and agricultural vehicles, in connection with the tractor trials.

*Oct. 9-19—Paris, Grand Palais, International Automobile Mfrs. Congress.

Oct. 14-16—Ottawa, Ont., Can. Interprovincial Plowing Match and Tractor Demonstration.

FOREIGN TRADE OPPORTUNITIES

WASHINGTON, Aug. 23—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies of business from individuals and companies in foreign countries. For further information address the Bureau of For-

November—Christchurch, N. Z. First National Motor.

Nov. 7-16—London. Olympia Motor Car Exhibition—Society of Motor Mfrs. and Trades.

December—Brussels. International Automobile Mfrs. Congress.

January—Glasgow, Scotland. Scottish Motor Exhibition.

February—Manchester, Eng. North of England Motor Exhibition.

Feb. 23-March 6—Birmingham, Eng. British Industries Fair.

March—London, Eng. Motor Boat, Marine and Stationary Engine Exhibition.

April or May—London, Eng. Commercial Vehicles Exhibition, Olympia.

AUTOMOTIVE SHOWS AT FAIRS

Aug. 20-29—Des Moines, Ia. Machinery Hall.

Aug. 26-29—Madison, Wis. Cars, trucks and tractors, accessories, Dane County Fair. Madison Assn. of Commerce.

Aug. 26-29—Columbus, O. Cars and tractors. E. V. Walborn, Manager.

Aug. 29—Detroit. Second Motor Show, Michigan State Fair.

Aug. 30-Sept. 6—Minnesota State Fair.

Aug. 31-Sept. 5—Lincoln, Neb. Cars, trucks and tractors. E. R. Danielson, Supt. of Concessions.

Sept. 1-5—Hartford, Conn. Connecticut Fair Assn.

Sept. 1-5—Wheeling, W. Va. Cars, trucks and tractors.

Sept. 1-5—Philadelphia. Tractor Demonstration and Truck Show, Philadelphia County Fair.

Sept. 1-6—Indianapolis, Ind. State Fair. Cars and Accessories. Indianapolis Automobile Trade Assn., John B. Orman, Manager.

Sept. 1-6—Rochester, N. Y. Automobile Club of Rochester. E. F. Edwards, Manager.

Sept. 1-6—Spokane, Wash. Cars, trucks and tractors.

Sept. 8-13—Helena, Mont. Cars, trucks and tractors, Montana State Fair.

Sept. 8-13—Milwaukee, Wis. Milwaukee Automobile Dealers, Inc., Bart J. Ruddle, Manager.

Sept. 8-13—Syracuse, N. Y. Cars, trucks and tractors.

Sept. 8-13—Topeka, Kan. Cars, trucks and tractors, Motor Hall and Machinery Field.

Sept. 9-13—Douglas, Wyo. Cars, trucks and tractors.

Sept. 12-20—Peoria, Ill. Cars, trucks and tractors.

Sept. 13-20—Hutchinson, Kan. Cars, trucks and tractors.

Sept. 14-20—Sioux City, Ia. Cars, trucks and tractors.

Sept. 15-20—Springfield, Mass. Cars, trucks and tractors. O. A. Nash, Asst. Gen. Manager.

Sept. 15-20—Yakima, Wash. Cars, trucks and tractors.

Sept. 16-19—Billings, Mont. Cars, trucks and tractors.

Sept. 20-27—Oklahoma City, Okla. Cars, trucks and tractors. J. S. Malone, General Manager.

Sept. 20-27—Memphis, Tenn. Cars, trucks and tractors.

Sept. 22-27—Allentown, Pa. Lehigh County Agricultural Assn.

Sept. 22-27—Pueblo, Colo. Cars, trucks and tractors. J. L. Bearman, Manager.

Sept. 22-27—Salem, Ore. Cars, trucks and tractors. Dealers' Motor Car Assn., M. O. Wilkins, Manager.

Sept. 24-Oct. 4—Kansas City, Kan. Cars, trucks and tractors.

Sept. 29-Oct. 4—Meridian, Miss. Cars and tractors. A. H. George, General Manager.

Sept. 29-Oct. 4—Chattanooga, Tenn. Chattanooga Auto Dealers' Assn.

Sept. 29-Oct. 4—Muskogee, Okla. Cars, trucks and tractors.

Sept. 30-Oct. 3—Brockton, Mass. Cars.

Sept. 30-Oct. 4—Lancaster, Pa. Lancaster Fair Assn.

October—Columbia, S. C. Columbia Automobile Dealers' Assn.

Oct. 6-19—Dallas, Tex. Cars, Trucks and Tractors, Texas State Fair.

Oct. 20-25—Raleigh, N. C. Cars, trucks and tractors.

Oct. 22-27—Shreveport, La. Cars, trucks and tractors.

TRACTOR SHOWS

Aug. 26-28—Rockford, Ill. County Fair.

Aug. 26-29—Harrisburg. Cars, tractors, trucks, automotive equipment. J. Clyde Myton, Manager, in connection with Grangers' Picnic at Williams Groves, Harrisburg Motor Dealers' Assn.

Aug. 26-30—Wausau, Pa. Marathon County Fair.

September—Los Angeles, Cal. Regional Tractor Demonstration under the auspices of the National Implement & Vehicle Assn.

Sept. 1-6—Greenville, S. C. Agricultural Implements and Tractors. F. M. Burnett, General Manager.

Sept. 8-13—Huron, S. D. Cars, tractors, trucks, automotive equipment. C. N. McIlvane, Manager.

Sept. 9-12—Streator, Ill. Northern Illinois Tractor & Truck Assn.

Sept. 15-20—Allentown, Pa. Lehigh County Agricultural Assn.

Sept. 22-28—Waterloo, Ia. Automobile show, in connection with Waterloo Dairy Cattle Congress; Black Hawk County Motor Trades Bureau, G. V. Orr, Secretary.

Oct. 15-18—Charleston, W. Va. Tractor Demonstration, Kanawha County Fair.

Nov. 22-29—Jacksonville, Fla. Florida State Fair and Exposition. B. K. Hanafourde, Manager.

February—Kansas City, Mo. Fifth Annual Kansas City Tractor Club, Guy H. Hall, Manager.

Feb. 9-14—Wichita, Kan. Tractor and Farm Machinery Forum, Wichita Threshers' Tractor Club.

CONTESTS

Aug. 23—Elgin, Ill. 308 Mile road race.

Sept. 1—Uniontown, Pa. Speedway race.

Sept. 20—Sheepshead Bay, L. I. Speedway race.

Sept. 27—Allentown, Pa. Dirt track event.

Oct. 4—Trenton, N. J. Dirt track event.

Oct. 11—Cincinnati, O. Speedway race.

Oct. 11—Danbury, Conn. Dirt track event.

*Nov. 27—Los Angeles, Cal. Ascot Speedway race.

July, 1920—Paris, France. Grand Prix Race, Sporting Commission, Automobile Club of France.

*Tentative date.

CONVENTIONS

Sept. 3—New York City. Annual meeting of the Automotive Service Assn. of New York, N. A. C. C. rooms, 7 E. 42d Street.

Sept. 8-9—Chicago. Industrial Conference Illinois Mfrs. Assn., Congress Hotel.

Sept. 11-12—Buffalo, N. Y. Annual Credit Manufacturers' Convention, Motor and Accessory Mfrs. Assn., Hotel Lafayette.

Sept. 22-24—Philadelphia. Annual Convention, National Association of Purchasing Agents, Bellevue-Stratford.

Sept. 24-25—Sheffield, Eng. Institute of Metals.

Oct. 1—Denver, Colo. Directors' Meeting, National Automobile Dealers' Assn.

Oct. 1-4—Cleveland. Eighth annual safety congress of National Safety Council.

Oct. 9-10—Jackson, Miss. Second Annual Convention, Louisiana - Mississippi Assn.

Oct. 14-17—Atlantic City, N. J. Twenty-fifth Annual Convention, Marlborough-Blenheim, National Hardware Association of the United States.

Oct. 29—Washington, D. C. Annual Labor Conference provided by Peace Treaty.

November—London, Eng. Road Transport Congress and Exhibition.

Nov. 3-8—Chicago, Ill. Convention, Automotive Equipment Assn., Medina Temple.

Nov. 7-8—Detroit. Meeting of National Assn. of Motor Truck Sales Managers, Hotel Statler.

Dec. 3-5—Cleveland. Ohio Automobile Trade Assn., Annual Convention.

January, 1920—Washington. Pan-American conference.

Feb. 9-13—Louisville, Ky. Seventeenth Annual Convention American Road Builders' Assn.; Tenth American Good Roads Congress and Eleventh National Good Roads Show.

May 15-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

ign and Domestic Commerce and specify the Foreign Trade Opportunity number.

India—Commercial motor vehicles, 1½-ton motor cars, two and four-seaters, spare motor parts for buses and passenger cars, motor accessories, solid tires for buses and pneumatic tires for passenger cars; electric motor parts, such as lamps,

horns, storage batteries and coils, and two good lines of motorcycles, light and heavyweight for solo and side car work. 30393.

Norway—Automobiles and rubber goods. Quotations should be given c.i.f. Norwegian port. Payment through banks. 30397.